F15-335-E
July, 2007

INSTRUCTION MANUAL

PCM-875
PLASMA ARC CUTTING PACKAGE

This manual provides installation and operation instructions for the following PCM-875 cutting packages starting with Serial No. PHJ205001:

P/N 36590 - 208/230 V, 1 & 3-Phase, 50/60 Hz
P/N 36592 - 460 V, 3-Phase, 50/60 Hz
P/N 36714 - 575 V, 3-Phase, 60 Hz
P/N 36725 - 400 V, 3-Phase, 50/60 Hz

CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

Be sure this information reaches the operator.
You can get extra copies through your supplier.

ESAB® ESAB Welding & Cutting Products

BE SURE THIS INFORMATION REACHES THE OPERATOR.
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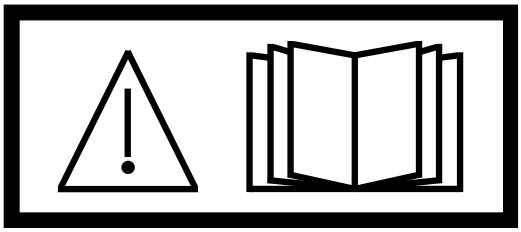
USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

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SAFETY PRECAUTIONS

WARNING: These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.

PROTECT YOURSELF AND OTHERS -- Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

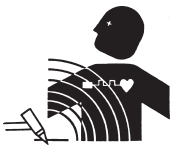
1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.

FIRES AND EXPLOSIONS -- Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.“
3. Do not weld, cut or perform other hot work until the workpiece has been completely cleaned so that there are no substances on the workpiece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

ELECTRICAL SHOCK -- Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
2. Connect the workpiece to a good electrical ground.
3. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.
4. Use well-maintained equipment. Replace worn or damaged cables.
5. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.
6. Make sure that all parts of your body are insulated from work and from ground.
7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
8. Put on dry, hole-free gloves before turning on the power.
9. Turn off the power before removing your gloves.
10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

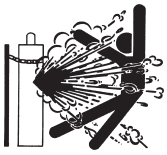


ELECTRIC AND MAGNETIC FIELDS — May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.
3. Welders should use the following procedures to minimize exposure to EMF:
   A. Route the electrode and work cables together. Secure them with tape when possible.
   B. Never coil the torch or work cable around your body.
   C. Do not place your body between the torch and work cables. Route cables on the same side of your body.
   D. Connect the work cable to the workpiece as close as possible to the area being welded.
   E. Keep welding power source and cables as far away from your body as possible.

FUMES AND GASES -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation. Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.



CYLINDER HANDLING -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

EQUIPMENT MAINTENANCE -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.

ADDITIONAL SAFETY INFORMATION -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"
5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding“
6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"“
7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.
8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."

This symbol appearing throughout this manual means **Attention! Be Alert! Your safety is involved.**

The following definitions apply to DANGER, WARNING, CAUTION found throughout this manual:

DANGER Used to call attention to immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.

WARNING Used to call attention to potential hazards which could result in personal injury or loss of life.

CAUTION Used to call attention to hazards which could result in minor personal injury.

PRÉCAUTIONS DE SÉCURITÉ

AVERTISSEMENT: Ces règles de sécurité ont pour objet d' assurer votre protection. Veillez à lire et à observer les précautions énoncées ci-dessous avant de monter l' équipement ou de commercer à l'utiliser. Tout défaut d'observation de ces précautions risque d'entraîner des blessures graves ou mortelles.

1. PROTECTION INDIVIDUELLE-- Les brûlures de la peau et des yeux dues au rayonnement de l'arc électrique ou du métal incandescent, lors du soudage au plasma ou à l'électrode ou lors du gougeage à l'arc, peuvent s'avérer plus graves que celles résultant d'une exposition prolongée au soleil. Aussi convient-il d'observer les précautions suivantes:

a. Portez un écran facial adéquat muni des plaques protectrices et des verres filtrants appropriés afin de vous protéger les yeux, le visage, le cou et les oreilles des étincelles et du rayonnement de l'arc électrique lorsque vous effectuez des soudures ou des coupes ou lorsque vous en observez l'exécution.
AVERTISSEZ les personnes se trouvant à proximité de façon à ce qu'elles ne regardent pas l'arc et à ce qu'elles ne s'exposent pas à son rayonnement, ni à celui du métal incandescent.

b. Portez des gants ignifugés à crispins, une tunique épaisse à manches longues, des pantalons sans rebord, des chaussures à embout d'acier et un casque de soudage ou une calotte de protection, afin d'éviter d'exposer la peau au rayonnement de l'arc électrique ou du métal incandescent. Il est également souhaitable d'utiliser un tablier ininflammable de façon à se protéger des étincelles et du rayonnement thermique.

c. Les étincelles ou les projections de métal incandescent risquent de se loger dans des manches retroussées, des bords relevés de pantalons ou dans des poches. Aussi convient-il de garder boutonnés le col et les manches et de porter des vêtements sans poches à l'avant.

d. Protégez des étincelles et du rayonnement de l'arc électrique les autres personnes travaillant à proximité à l'aide d'un écran ininflammable adéquat.

e. Ne jamais omettre de porter des lunettes de sécurité lorsque vous vous trouvez dans un secteur où l'on effectue des opérations de soudage ou de coupage à l'arc. Utilisez des lunettes de sécurité à écrans ou verres latéraux pour piquer ou meûler le laitier. Les piquetures incandescentes de laitier peuvent être projetées à des distances considérables. Les personnes se trouvant à proximité doivent également porter des lunettes de protection.

f. Le gougeage à l'arc et le soudage à l'arc au plasma produisent un niveau de bruit extrêmement élevé (de 100 à 114 dB) et exigent par conséquent l'emploi de dispositifs appropriés de protection auditive.

2. PRÉVENTION DES INCENDES-- Les projections de laitier incandescent ou d'étincelles peuvent provoquer de graves incendies au contact de matériaux combustibles solides, liquides ou gazeux. Aussi faut-il observer les précautions suivantes:

a. Éloigner suffisamment tous les matériaux combustibles du secteur où l'on exécute des soudures ou des coupes à l'arc, à moins de les recouvrir complètement d'une bâche non-inflammable. Ce type de matériaux comprend notamment le bois, les vêtements, la sciure, l'essence, le kérosène, les peintures, les solvants, le gaz naturel, l'acétylène, le propane et autres substances combustibles semblables.

b. Les étincelles ou les projections de métal incandescent peuvent tomber dans des fissures du plancher ou dans des ouvertures des murs et y déclencher une ignition lente cachée. Veiller à protéger ces ouvertures des étincelles et des projections de métal.

c. N'exécutez pas de soudures, de coupes, d'opérations de gougeage ou autres travaux à chaud à la surface de barils, bidons, réservoirs ou autres contenants usagés, avant de les avoir nettoyés de toute trace de substance susceptible de produire des vapeurs inflammables ou toxiques.

d. En vue d'assurer la prévention des incendies, il convient de disposer d'un matériel d'extinction prêt à servir immédiatement, tel qu'un tuyau d'arrosage, un seau à eau, un seau de sable ou un extincteur portatif.

e. Une fois le travail à l'arc terminé, inspectez le secteur de façon à vous assurer qu'aucune étincelle ou projection de métal incandescent ne risque de provoquer ultérieurement un feu.

3. CHOC ÉLECTRIQUE-- Le gougeage à l'arc et à l'arc au plasma exige l'emploi de tensions à vide relativement importantes; or, celles-ci risquent de causer des dommages corporels graves et même mortels en cas d'utilisation inadéquate. La gravité du choc électrique reçu dépend du chemin suivi par le courant à travers le corps humain et de son intensité.

a. Ne laissez jamais de surfaces métalliques sous tension venir au contact direct de la peau ou de vêtements humides. Veillez à porter des gants bien secs.

b. Si vous devez effectuer un travail sur une surface métallique ou dans un secteur humide, veillez à assurer votre isolation corporelle en portant des gants secs et des chaussures à semelles de caoutchouc et en vous tenant sur une planche ou une plate-forme sèche.

c. Mettez toujours à la terre le poste de soudage/coupage en le reliant par un câble à une bonne prise de terre.

d. N'utilisez jamais de câbles usés ou endommagés. Ne surchargez jamais le câble. Utilisez toujours un équipement correctement entretenu.

e. Mettez l'équipement hors tension lorsqu'il n'est pas en service. une mise à la masse accidentelle peut en effet provoquer une surchauffe de l'équipement et un danger d'incendie. Ne pas enrouler ou passer le câble autour d'une partie quelconque du corps.

f. Vérifiez si le câble de masse est bien relié à la pièce en un point aussi proche que possible de la zone de travail. Le branchement des câbles de masse à l'ossature du bâtiment ou en un point éloigné de la zone de travail augmente en effet le risque de passage d'un courant de sortie par des chaînes delevage

des câbles de grue ou divers chemins électriques.

g. Empêchez l'apparition de toute humidité, notamment sur vos vêtements, à la surface de l'emplacement de travail, des câbles, du porte-électrode et du poste de soudage/coupage. Réparez immédiatement toute fuite d'eau.

4. VENTILATION-- La respiration prolongée des fumées résultant des opérations de soudage/coupage, à l'intérieur, d'un local clos, peut provoquer des malaises et des dommages corporels. Aussi convient-il d'observer les précautions suivantes:

a. Assurez en permanence une aération adéquate de l'emplacement de travail en maintenant une ventilation naturelle ou à l'aide de moyens mécaniques. N'effectuez jamais de travaux de soudage ou de coupage sur des matériaux de zinc, de plomb, de beryllium ou de cadmium en l'absence de moyens mécaniques de ventilation capables d'empêcher l'inhalation des fumées dégagées par ces matériaux.

b. N'effectuez jamais de travaux de soudage ou de coupage à proximité de vapeurs d'hydrocarbure chloré résultant d'opérations voisines de dégraissage ou de pulvérisation. La chaleur dégagée ou le rayonnement de l'arc peut déclencher la formation de phosgène -- gaz particulièrement toxique -- et d'autres gaz irritants, à partir des vapeurs de solvant.

c. Une irritation momentanée des yeux, du nez ou de la gorge constatée au cours de l'utilisation de l'équipement dénote un défaut de ventilation. Arrêtez-vous de travailler afin de prendre les mesures nécessaires à l'amélioration de la ventilation. Ne poursuivez pas l'opération entreprise si le malaise persiste.

d. Certaines commandes comportent des canalisations où circule de l'hydrogène. L'armoire de commande est munie d'un ventilateur destiné à empêcher la formation de poches d'hydrogène, lesquelles présentent un danger d'explosion; ce ventilateur ne fonctionne que si l'interrupteur correspondant du panneau avant se trouve placé en position ON (Marche). Veillez à manœuvrer cette commande en vérifiant si le couvercle est bien en place, de façon à assurer l'efficacité de la ventilation ainsi réalisée. Ne jamais débrancher le ventilateur.

e. Les fumées produites par l'opération de soudage ou de coupage peuvent s'avérer toxiques. Aussi est-il nécessaire de disposer en permanence d'un dispositif adéquat de ventilation de type aspirant, afin d'éliminer du voisinage de l'opérateur tout dégagement de fumée visible.

f. Consultez les recommandations particulières en matière de ventilation indiquées à l'alinéa 6 de la norme Z49.1 de l'AWS.

5. ENTRETIEN DE L'ÉQUIPEMENT-- Un équipement entretenu de façon défectueuse ou inadéquate risque non seulement de réaliser un travail de mauvaise qualité mais, chose plus grave encore, d'entraîner des dommages corporels graves, voire mortels en déclenchant des incendies ou des chocs électriques. Observez par conséquent les précautions suivantes:

a. Efforcez-vous de toujours confier à un personnel qualifié l'installation, le dépannage et l'entretien du poste de soudage et de coupage. N'effectuez aucune réparation électrique sur l'équipement à moins d'être qua-lifié à cet effet.

b. Ne procédez jamais à une tâche d'entretien quelconque à l'intérieur du poste de soudage/coupage, avant d'avoir débranché l'alimentation électrique.

c. Maintenez en bon état de fonctionnement les câbles, le câble de masse, les branchements, le cordon d'alimentation et le poste de soudage/coupage. N'utilisez jamais le poste ou l'équipement s'il présente une défectuosité quelconque.

d. Prenez soin du poste de soudage et de coupage et des équipements accessoires. Gardez-les à l'écart des sources de charleur, notamment des fours, de l'humidité, des flaques d'eau maintenez-les à l'abri des traces d'huile ou de graisse, des atmosphères corrosives et des intempéries.

e. Laissez en place tous les dispositifs de sécurité et tous les panneaux de l'armoire de commande en veillant à les garder en bon état.

f. Utilisez le poste de soudage/coupage conformément à son usage prévu et n'effectuez aucune modification.

6. INFORMATIONS COMPLÉMENTAIRES RELATIVES À LA SÉCURITÉ--

Pour obtenir des informations complémentaires sur les règles de sécurité à observer pour le montage et l'utilisation d'équipements de soudage et de coupage électriques et sur les méthodes de travail recommandées, demandez un exemplaire du livret N° 52529 "Precautions and Safe Practices for Arc Welding, Cutting and Gouging" publié par ESAB. Nous conseillons également de consulter les publications sui-vantes, tenues à votre disposition par l'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 32126:

a. "Safety in Welding and Cutting" AWS Z49.1

b. "Recommended Safe Practices for Gas-Shielded Arc Welding "AWS A6. 1.

c. "Safe Practices for Welding and Cutting Containers That Have Held Combustibles" AWS-A6.0.

d. "Recommended Safe Practices for Plasma Arc Cutting" AWS-A6. 3.

e. "Recommended Safe Practices for Plasma Arc Welding" AWS-C5. 1.

f. "Recommended Safe Practices for Air Carbon Arc Gouging and Cutting" AWS-C5. 3.

g. "Code For Safety in Welding and Cutting" CSA-Standard W117. 2.

1.1 GENERAL

The PCM-875 is a compact, completely self-contained plasma cutting system. As shipped, the system is fully assembled and ready to cut after being connected to input power and a source of compressed air (90-150 psi). The PCM-875 package uses the heavy-duty PT-27 torch to deliver cutting power for severing materials up to 1-1/4 inch thick. Refer to the following paragraphs for descriptions of the PCM-875 packages available as well as performance specifications.

⚠ WARNING

Use only ESAB Plasmarc torches that are designed for use with this console. Use of torches not designed for use with this console could create an ELECTRIC SHOCK HAZARD. Do NOT use or modify the PT-23, PCT-80 or any other torch for use on this console.

1.2 SCOPE

The purpose of this manual is to provide the operator with all the information required to install and operate the PCM-875 plasma arc cutting package. Technical reference material is also provided to assist in troubleshooting the cutting package.

1.3 PACKAGES AVAILABLE

1.3.1 Manual Cutting Packages

PCM-875 packages listed on the front cover includes the following components:

PT-27 Torch, 75° head, 25-ft. ..... P/N 21661
PT-27 Spare Parts Kit (see Table 1-1) ..... P/N 21623
PCM-875 Console/Power Source ..... See below

Depending on the choice of input power, each package includes the following appropriate PCM-875 Console/ Power Source:

208/230 V, 50/60 Hz, 1 or 3-phase ..... P/N 36580
460 V, 50/60 Hz, 3-phase ..... P/N 36584
575 V, 60 Hz, 3-phase ..... P/N 36713
400 V, 50/60 Hz, 3-phase ..... P/N 36724

1.3.2 Mechanized Cutting Packages

Also available are mechanized packages using the PT-20AM Mechanized Plasma Torch with the PCM-875 Console/Power Source. A typical package includes: PCM-875 Console/Power Source, PT-20AM Torch (4.5 or 17 ft.), Remote Arc Starter, Torch Spare Parts Kit, Pilot Arc Cable (50 or 100 ft.), Power Cable (50 or 100 ft.), Gas Hose (50 or 100 ft.), Arc Starter AC Power Cable (50 or 100 ft.) and a hose adaptor. See Section 2.8 for installation details and part numbers of components.

The following PCM-875 Mechanized Packages are available:

875M, 230V/PT-20AM, 4.5'/50'System ..... P/N 37617
875M, 230V/PT-20AM, 4.5'/100' System ..... P/N 37618
875M, 230V/PT-20AM, 17'/50' System ..... P/N 37619
875M, 230V/PT-20AM, 17'/100' System ..... P/N 37620
875M, 460V/PT-20AM, 4.5'/50'System ..... P/N 37621
875M, 460V/PT-20AM, 4.5'/100' System ..... P/N 37622
875M, 460V/PT-20AM, 17'/50' System ..... P/N 37623
875M, 460V/PT-20AM, 17'/100' System ..... P/N 37624

Table 1-1. PT-27 Spare Parts Kit, P/N 21623, Contents

Description	Part Number	Quantity
50 - 60 A Nozzle	33369	4
Electrode	33366	3
Swirl Baffle	33367	1
Heat Shield	21616	2
Standoff Guide	21420	1
Valve Pin	21619	1
Fuse, 15 A, 600 VDC, Fast Acting	952137	1

1.4 SPECIFICATIONS

Table 1-2. PCM-875 Specifications

Rated Output	60% Duty Cycle*	60 A @ 120 V dc
	100% Duty Cycle*	50 A @ 120 V dc
Output Current Range		10 to 60 Amperes
Open Circuit Voltage		275 V dc
Rated Primary Input @ 7.2 kW Max. Output Power 60 A @ 120 Vdc	208/230 V ac, 50/60 Hz, 3-phase	26/24 A/phase
	208/230 V ac, 50/60 Hz, 1-phase	55/49 A
	400 V ac, 50/60 Hz, 3-phase	13 A/phase
	460 V ac, 50/60 Hz, 3-phase	11 A/phase
	575 V ac, 50/60 Hz,	9 A/phase
Power Factor @ 60 Amperes Output		74% (208/230 V, 1-phase) 90% (208/230 V, 3-phase) 92% (400/460 & 575 V, 3-phase)
Efficiency @ 60 Amperes Output		90% Typical
Current Capacity	PT-27	80 A DCSP
Air Requirements	PT-27	320 cfh @ 65 - 75 psig (150 l/min @ 4.5 - 5.2 bars)
Dimensions	Length Height w/handles Width w/o opt. storage w/ opt. torch storage	20.3" (516 mm) 16.1" (409 mm) 18.3" (465 mm) 10.1" (275 mm) 13.1" (333 mm)
Weight of PCM-875 System Shipping Weight		87 lbs (39.5 kg) 100 lbs (45.4 kg)

*Duty cycle is based on a 10-minute period; therefore, a 60-percent duty cycle means the power source may operate for 6 minutes with a cool down period of 4 minutes and a 100-percent duty cycle means the power source may operate continuously.

Table 1-3. PT-27 Torch Specifications

Current Capacity (100% duty)	80 A DCSP
Length of Service Lines	25 ft or 50 ft
Weight	
25 ft	5.2 lbs (2.4 kg)
50 ft	9.6 lbs (4.4 kg)

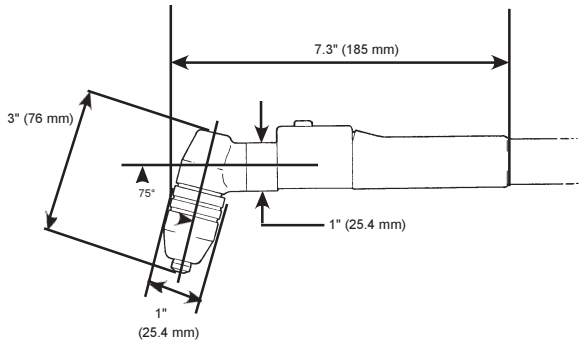


Figure 1-1. PT-27 Dimensions

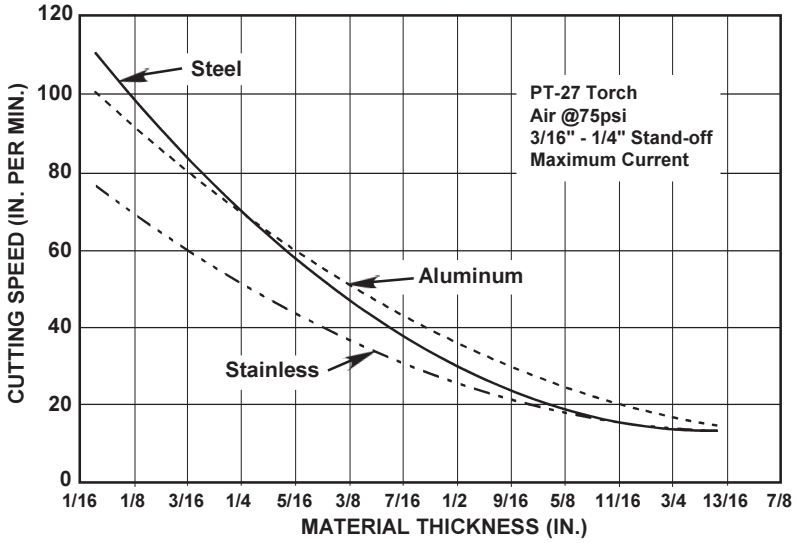


Figure 1-2. PT-27/PCM 875 Cutting Performance

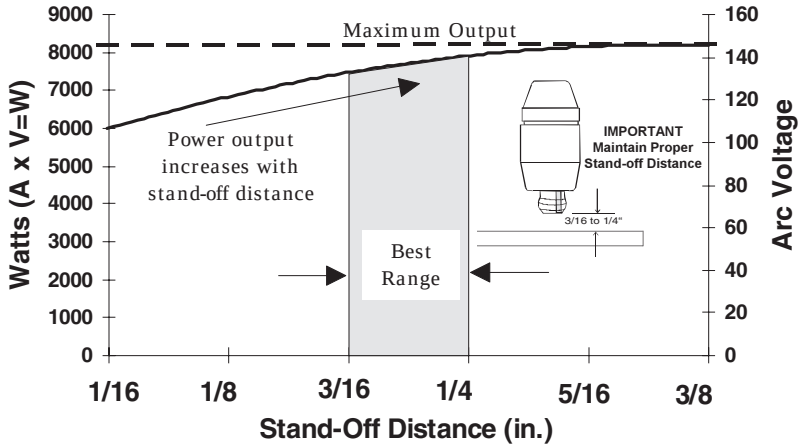


Figure 1-3. Standoff vs. Power Output

1.5 OPTIONAL ACCESSORIES

1. **Torch Wrap/Spare Parts Kit Holder, P/N 33952GY.** Units have 4 mounting holes on left side for mounting this accessory holder.
2. **Wheel Cart, P/N 34324.** This 5 7/8" high cart has front swivel casters and rear casters to make it easier to roll the PCM-875 around the job site.

2.1 GENERAL

Proper installation is important for satisfactory and trouble-free operation of the PCM-875 cutting package. It is suggested that each step in this section be studied carefully and followed closely.

2.2 EQUIPMENT REQUIRED

A source of clean, dry air that supplies 320 cfh at 65-75 psig is required for the cutting operation. The air supply should not exceed 150 psig (the maximum inlet pressure rating of the air filter-regulator supplied with the package).

2.3 LOCATION

Adequate ventilation is necessary to provide proper cooling of the PCM-875. The amount of dirt, dust, and excessive heat to which the equipment is exposed, should be minimized. There should be at least one foot of clearance between the PCM-875 power source and wall or any other obstruction to allow freedom of air movement through the power source.

CAUTION

Installing or placing any type of filtering device will restrict the volume of intake air, thereby subjecting the power source internal components to overheating. The warranty is void if any type of filter device is used.

2.4 INSPECTION

A. Remove the shipping container and all packing material and inspect for evidence of concealed damage which may not have been apparent upon receipt of the PCM-875. Notify the carrier of any defects or damage at once.

B. Check container for any loose parts prior to disposing of shipping materials.

C. Check air louvers and any other openings to ensure that any obstruction is removed.

2.5 PRIMARY ELECTRICAL INPUT CONNECTIONS (FIGURE 2-1)

WARNING

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when connections are made inside of the power source.

CAUTION

Be sure that the power source is properly configured for your input power supply. DO NOT connect a power source configured for 208/230 V to a 460 V input power supply. Damage to the machine may occur.

NOTE: If using 200(208) V input power, the PCM-875 must be reconnected for 200 V use as directed in Section 2.7 and Fig. 2-2.

The PCM-875 consoles are equipped with a 10-ft, 4-conductor input power cable for 3-phase connection. If single-phase connection is desired, tape back the red wire on the input power cable.

NOTE: The 208/230 V models are equipped with a plug for single-phase connection only. The plug is mounted to a 4-conductor cable. If 3-phase connection is desired, remove and discard the plug and proceed as described above.

A line (wall) disconnect switch with fuses or circuit breakers should be provided at the main power panel (see Fig. 2-1 and Table 2-1 for fuse sizes). The input power cable of the console may be connected directly to the disconnect switch or you may purchase a proper plug and receptacle from a local electrical supplier. If using plug/receptacle combination, see Table 2-1 for recommended input conductors for connecting receptacle to line disconnect switch.

WARNING

The chassis must be connected to an approved electrical ground. Failure to do so may result in electrical shock, severe burns or death.

Table 2-1. Recommended Sizes For Input Conductors and Line Fuses

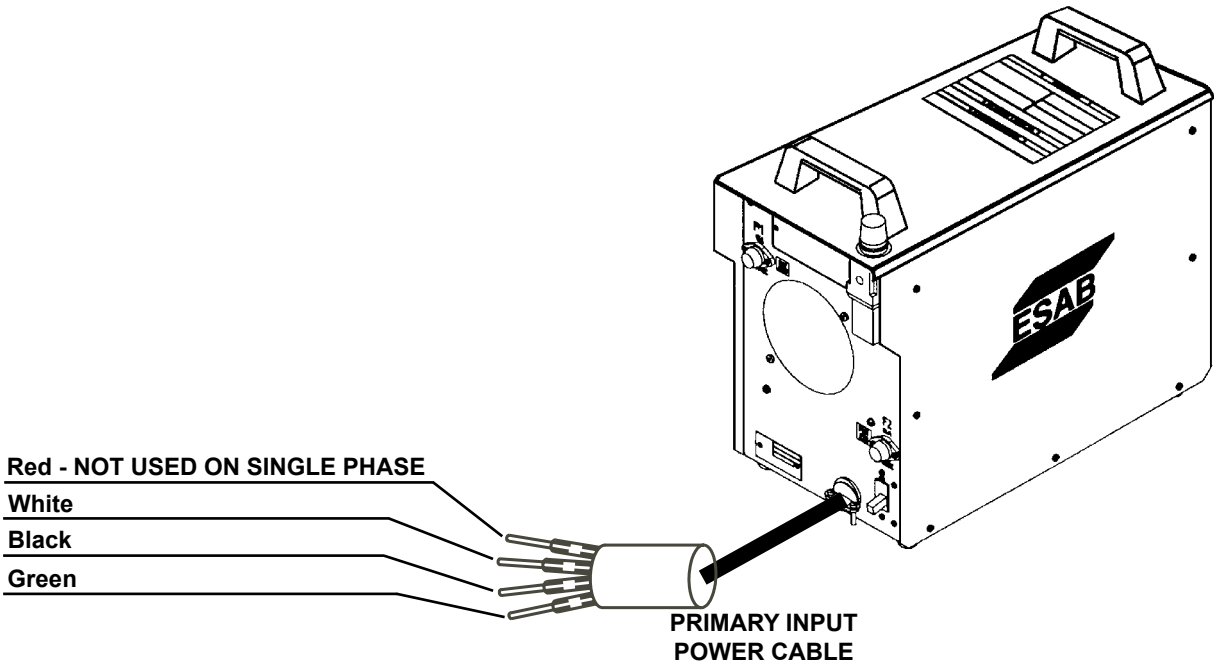
Input Requirements			Input & Gnd Conductor CU/AWG	Fuse Size Amps
Volts	Phase	Amps		
208	1	55A	6	80
208	3	26A/Ph.	6	50
230	1	49A	6	80
230	3	24A/Ph.	6	50
400	3	13	10	25
460	3	11	10	25
575	3	9	10	20

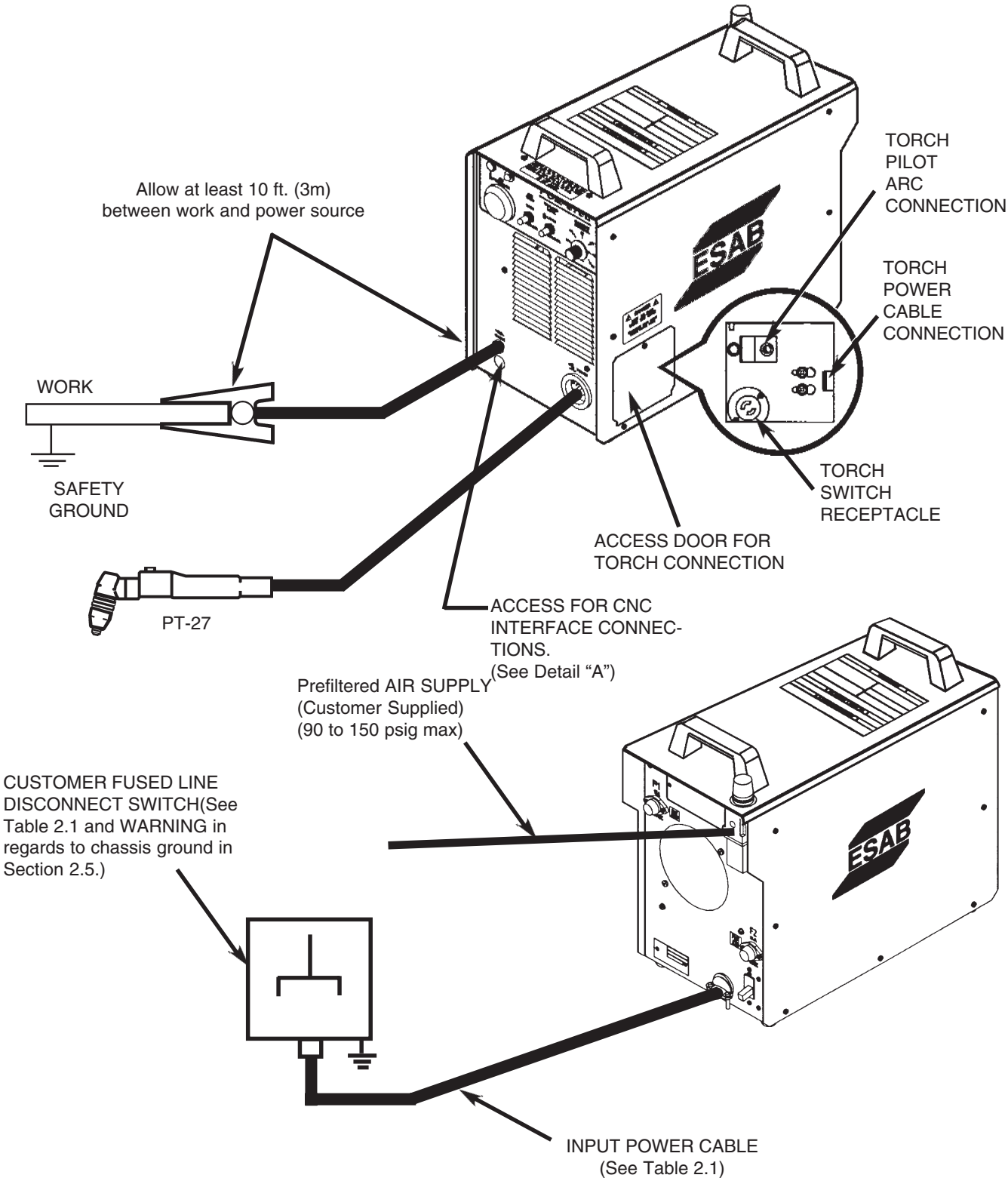
2.6 SECONDARY (OUTPUT) CONNECTIONS (REFER TO FIG. 2-1)

WARNING

Before making any connections to the power source output terminals, make sure that all primary input power to the power source is deenergized (off) at the main disconnect switch and that the input power cable is unplugged.

1. For operator safety, the torch connections are located on the output terminal board behind the lower portion of the front panel. Remove access door to output terminal board from right panel of power source.
2. Thread the power cable, pilot arc cable and switch lead of the PT-27 through the right open bushing of the front panel. Connect power cable to the torch fitting (left-hand threads); bolt the pilot arc cable ring connection to the copper terminal; and plug in the switch lead to the torch switch receptable on the output terminal board. Make sure the power and pilot arc cable connections are wrench-tight. Make sure plug of switch lead is firmly locked in place.
3. Reassemble the access door to the power source.
4. Connect your air supply to the inlet connection of the filter-regulator.
5. Clamp the work cable to the workpiece. Be sure the workpiece is connected to an approved earth ground with a properly sized ground cable.





NOTE: ***The 208/230 V models are equipped with a plug for single-phase connection only. The plug is mounted to a 4-conductor cable. If 3-phase connection is desired, remove and discard the plug and refer to Sect. 2.5.***

Figure 2-1. PCM-875 Interconnection Diagram

2.7 CONNECTING PCM-875 FOR 200(208) VAC INPUT

WARNING

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when reconnecting for 200(208) VAC Input.

The PCM-875 power source with 200/230 vac, 1-phase input capability is factory set for 230 vac input. If using 200(208) vac input, the PCM-875 must be reconnected as follows before connecting to your input power:

1. Remove cover from the PCM-875 power source.
2. Locate the Input Bridge (IBR) and TB5 terminal block (see Fig. 1) on the left side towards the rear panel. Disconnect the gray lead from TB5-2 and then connect it to TB5-1.
3. Locate the output bridge (D1) on left side towards the front panel (see Fig. 2). Disconnect and swap leads X2 and X3 from the main transformer. For 200(208) vac input, X2 is connected to TB3 and X3 is connected to terminal 3 of D1. Make sure the connections are firmly tightened.
4. Leave all other wires the same.
5. Reinstall cover and connect the PCM-875 to 208 vac input power.

Fig. 1

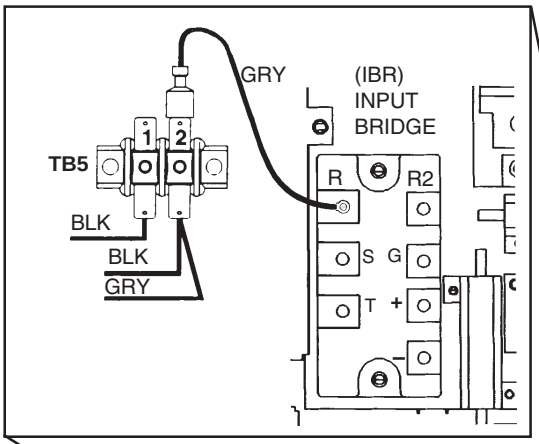
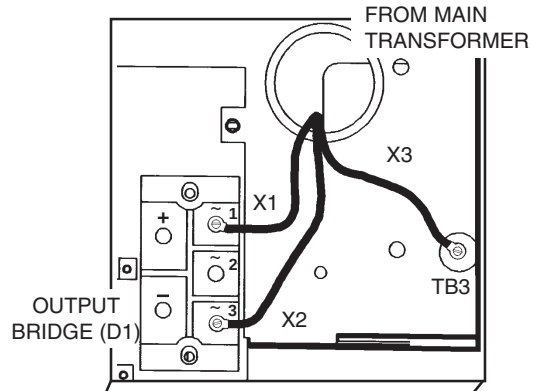


Fig. 2



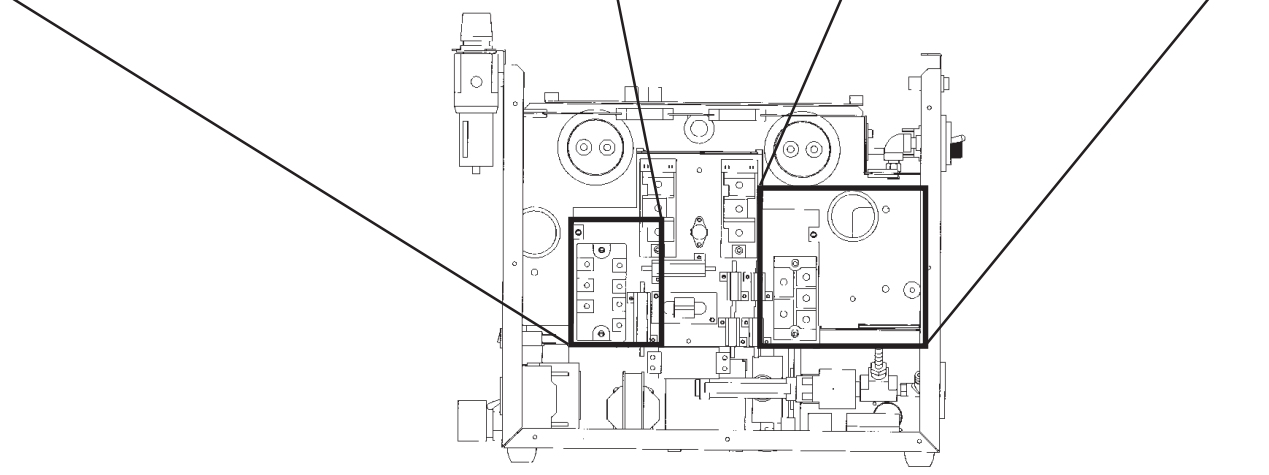
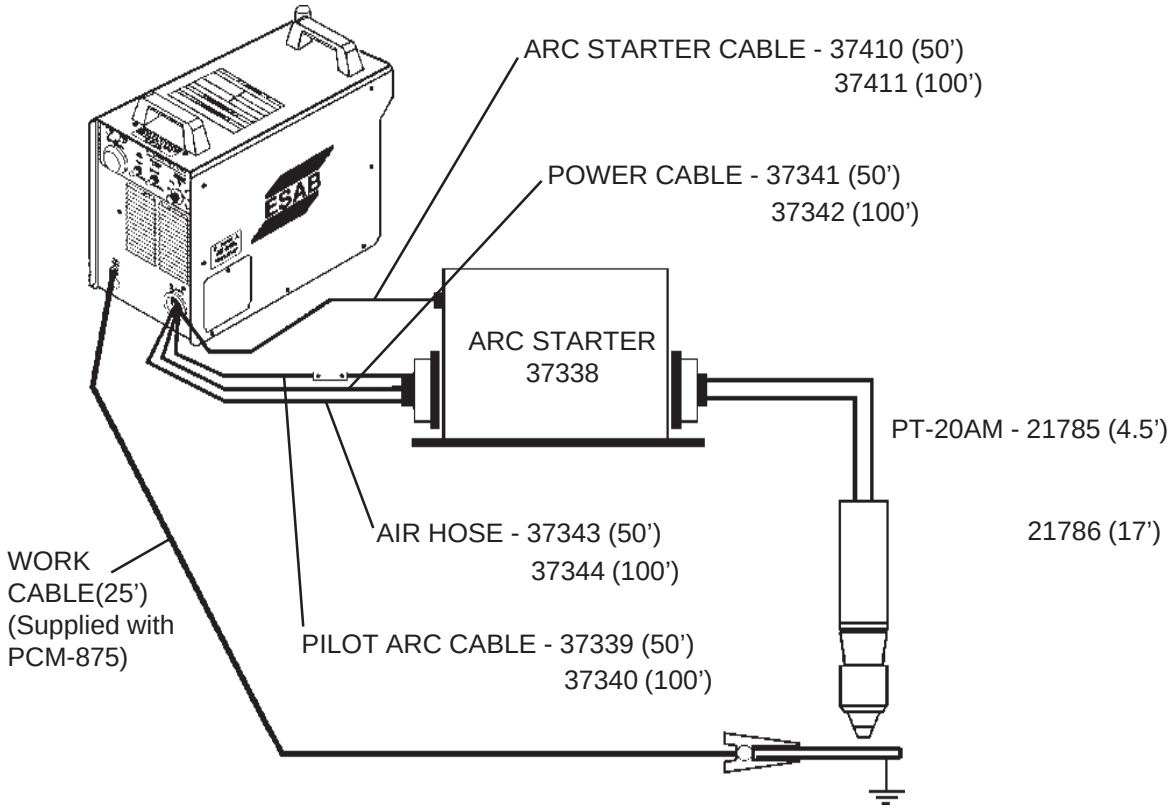


Figure 2-2. Original Factory Setup for 230 Vac Input on Power Source with 200/230 Vac Input Power Capability

2.8 MECHANIZED CUTTING INSTALLATION WITH THE PT-20AM TORCH

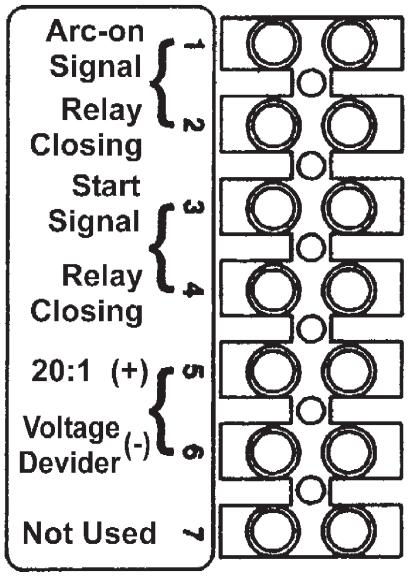
CAUTION

Installation for mechanized cutting should be performed by an experienced service technician. Do NOT permit untrained persons to install, operate, or maintain this equipment. Be sure to read all Safety Precautions before installing or servicing this equipment.

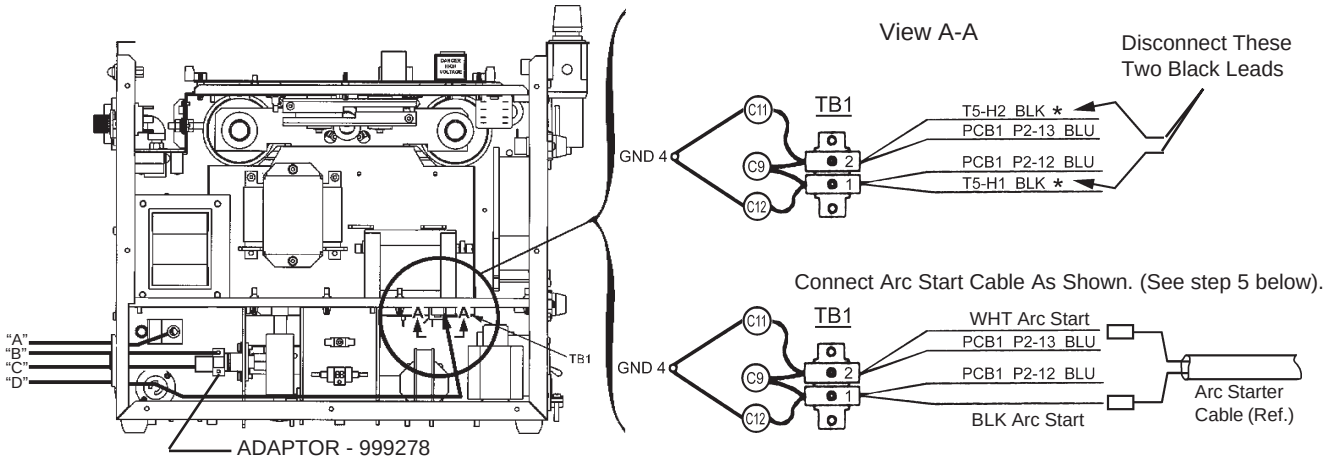


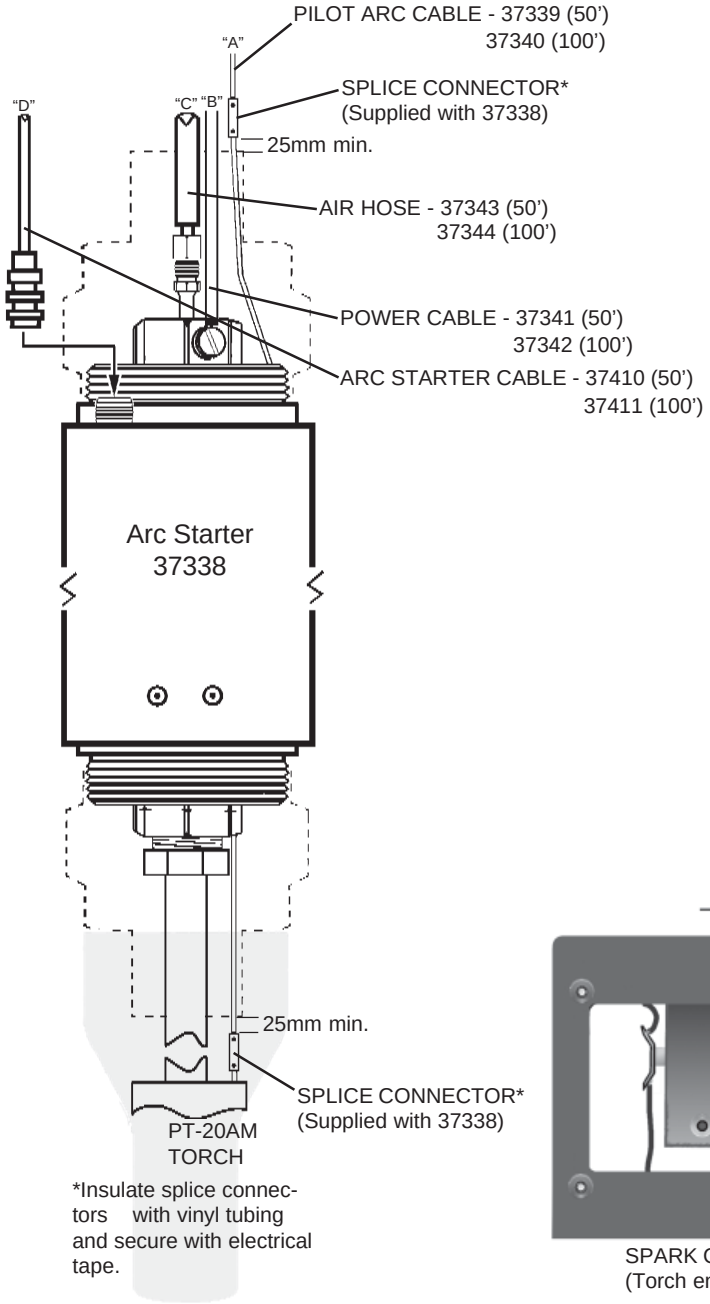
SCHEMATIC - MECHANICAL SYSTEM SETUP (See Figure 2-4 for detailed connections)

NOTE:
Use Cable P/N 2239902
(UL / CSA approved cable
Flex, 20 guage, 12 conductor
with copper braided shield)



CNC Interface Connection (Located inside console, left side of base.)
Figure 2.3 - MECHANICAL CUTTING INTERFACE DIAGRAM

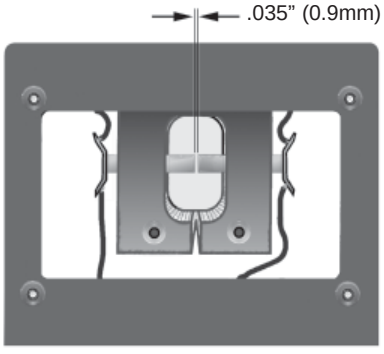




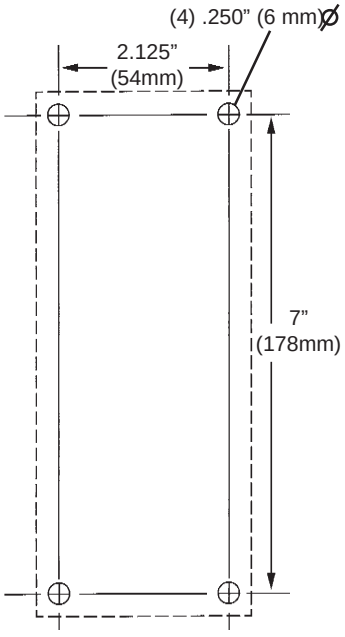
WARNING

Make sure all power is off before making following connections.

1. Remove cover from PCM-875.
2. Insert the 4 service lines from Arc Starter through the torch opening of front panel.
3. Connect large hole terminal end of Pilot Arc Cable ("A") to connection where shown. Tighten screw firmly.
4. Connect adaptor 999278 to fitting where shown. Connect Air Hose ("C") to adaptor. Connect power cable ("B") to one of the threaded holes of adaptor. Tighten all connections firmly.
5. Locate TB1 Terminal Block. Referring to view D-D above, disconnect the two black wires from TB1. Connect the black lead of Arc Starter Cable ("D") to TB1-1 and the white lead to TB1-2.
6. Reassemble cover. Proceed to connect the 4 service lines to the Arc Starter. Then connect PT-20AM torch to Arc Starter.



SPARK GAP ASSEMBLY
(Torch end of Arc Starter)



MOUNTING DIMENSIONS

Figure 2.4 Connection Diagram - PCM-875/PT-20AM with Arc Starter

3.1 OPERATION

ELECTRIC SHOCK can kill.

- **Do NOT operate the unit with the cover removed.**
- **Do NOT apply power to the unit while holding or carrying the unit.**
- **Do NOT touch any torch parts forward of the torch handle (nozzle, heat shield, electrode, etc.) with power switch on.**

ARC RAYS can burn eyes and skin;
NOISE can damage hearing.

- **Wear welding helmet with No. 6 or 7 lens shade.**
- **Wear eye, ear, and body protection.**

CAUTION

Position the PCM-875 at least 10 feet (3 meters) from the cutting area. Sparks and hot slag from the cutting operation can damage the unit.

3.2 PCM-875 CONTROLS (FIGURE 3-1)

A. **Power Switch (located on rear panel).** When placed in ON position, the green pilot light will glow indicating control circuit is energized and the cooling fan will run.

B. **Output Current Control.** Adjustable from 10 to 60 amperes.

C. **Air Test Switch.** When placed in Test position, air filter-regulator can be adjusted to desired pressure (65-75 psig) before cutting operations. Allow air to flow for a few minutes. This should remove any condensation that may have accumulated during shutdown period. Be sure to place switch in OPERATE position before starting cutting operations.

D. **Trigger Lock Switch.** When placed in LOCK position, this permits releasing torch switch button after cutting arc has been initiated. To extinguish arc at end of cut, press and release torch switch button again or pull torch away from work. When placed in UNLOCK position, torch switch must be held closed by the operator during the entire cutting operation and then released at the end of cut.

E. **Fault Light.** Will glow amber under the following conditions and operations will come to a complete stop.

Flow Fault: The fault light will be **mostly on** but will flick off for about 1/10th of a second every second. This indicates that the air flow supply is low.

Over Temperature: The fault light will be **mostly off** but will flick on for about 1/10th of a second every second. This indicates that the duty cycle has been exceeded. Allow the power source to cool down before returning to operate.

High/Low Line Voltage: The fault light will **rapidly blink on and off** (five times per second). This indicates that the input voltage is outside the "+ or -" 15% range of the input rating.

Over-Current: The fault light will be on **continuously**. This indicates that input current has been exceeded.

All fault signals will remain on for a minimum of 10 seconds. If fault clears, all will reset automatically except for over-current. To clear over-current, the power must be shut off for 5 seconds and then turned back on.

3.3 CUTTING WITH THE PT-27

Use the following procedures to cut with the PT-27 torch (Figure 3-4).

A. Hold the torch nozzle approximately 1/8 to 3/16 inch above the work and tilted at about 15 - 30°. This reduces the chance of spatter entering the nozzle. If the PT-27's standoff tool is being used, set the standoff between 3/16 and 1/4-inch.

B. Depress the torch switch. Air should flow from the torch nozzle.

C. Two seconds after depressing the torch switch, the pilot arc should start. The main arc should immediately follow, allowing the cut to begin. (If using the trigger LOCK mode, torch switch may be released after establishing the cutting arc.)

D. After starting the cut, the torch should be maintained at a 5-15° forward angle (Figure 3-2). This angle is especially useful in helping to create a "drop" cut. When not using the standoff guide, the nozzle should be held approximately 1/4 inch from the work.

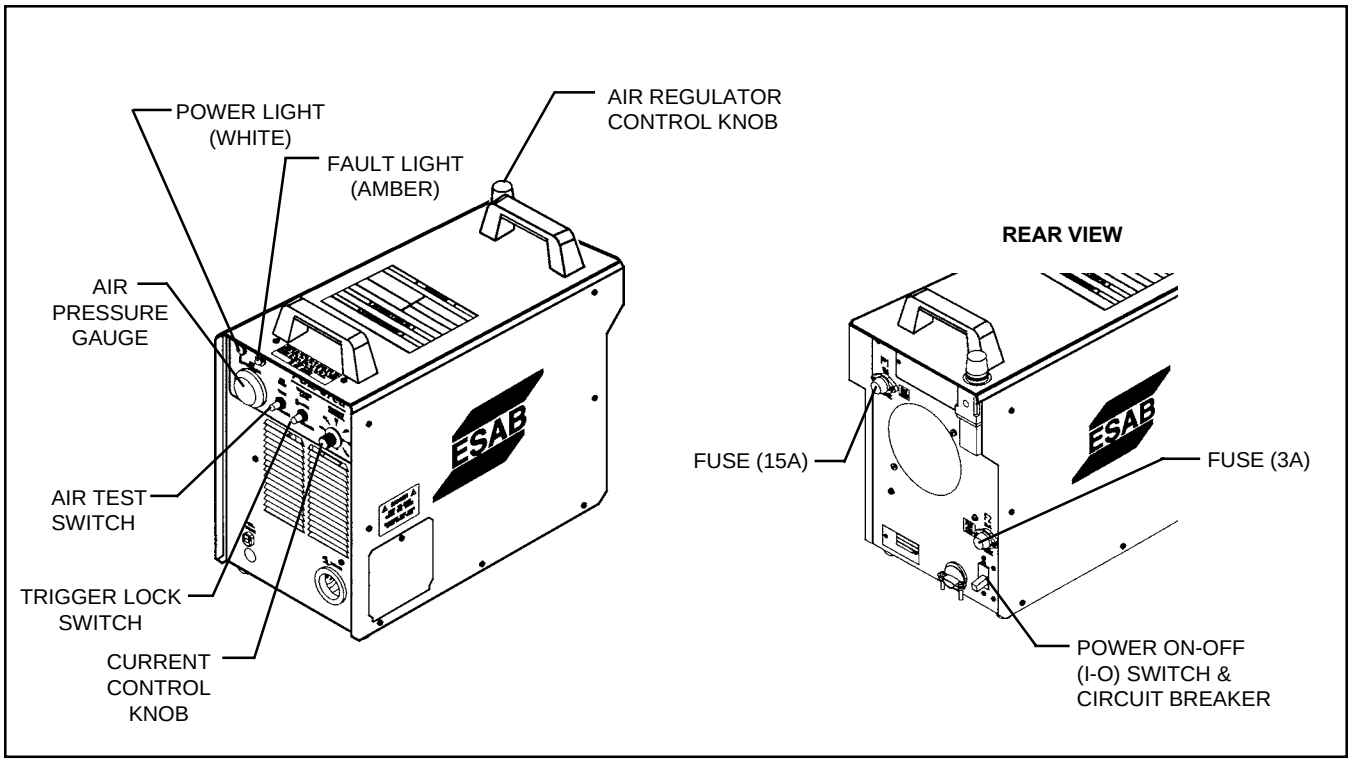


Figure 3-1. PCM-875 Controls

E. When ending a cut, the torch switch should be released (press and release if using trigger LOCK mode) and lifted off the workpiece just before the end of the cut. This is to prevent the high frequency from reigniting after cutting arc extinguishes and causing damage to the nozzle (double arcing).

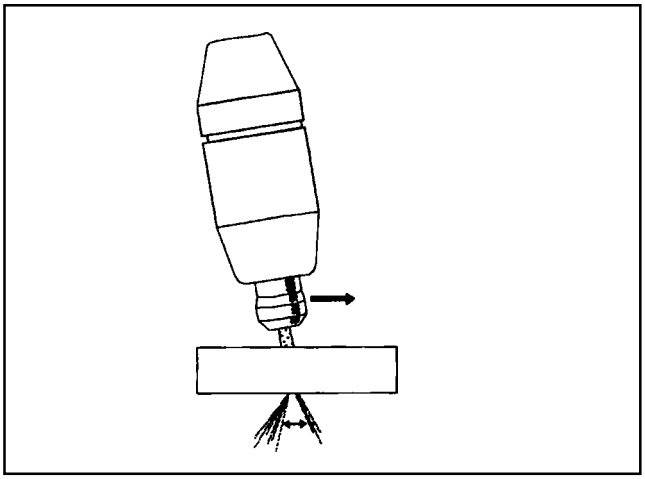


Figure 3-2. Recommended Torch Angle of 5° to 15°

F. For rapid re-starts, such as grate or heavy mesh cutting, do not release the torch switch. In the postflow mode, the arc can be re-started immediately by depressing the torch switch. This avoids the 2-second preflow portion of the cutting cycle.

NOTE: When replacing the nozzle, always inspect the electrode for wear. If less than 19/32" of electrode shaft is remaining, replace the electrode. If the electrode is used beyond this recommended wear limit, damage to the torch and power source may occur. Nozzle life is also greatly reduced when using the electrode below the recommended limit. Refer to Figure 3-3.

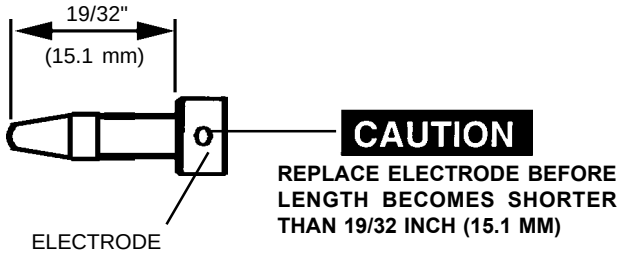


Figure 3-3. Electrode Wear Limit

3.3.1. Drag Cutting with the PT-27/PCM-875 System
If drag cutting is desired, the 15 amp pilot arc fuse located on the rear panel must be removed. This converts pilot arc starting to high frequency starting allowing you to cut by dragging the torch nozzle on the workpiece. Cutting thickness should not exceed 3/8" for drag cutting.

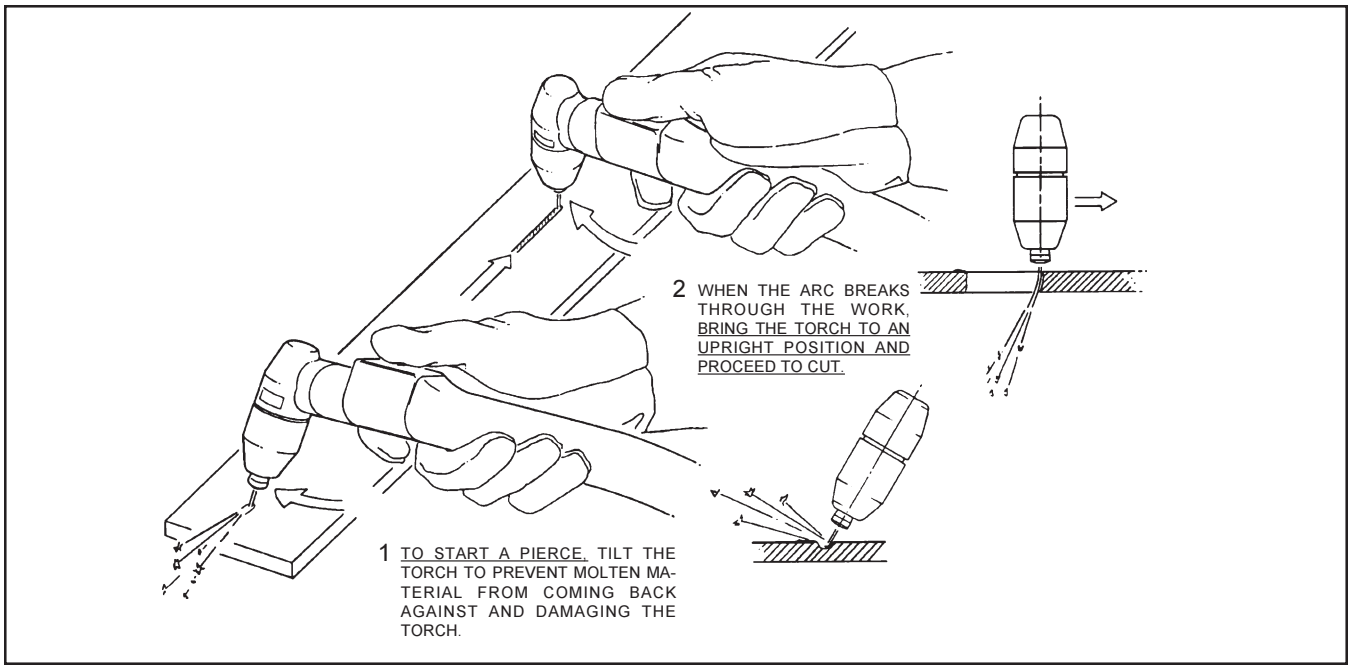

2 WHEN THE ARC BREAKS THROUGH THE WORK, BRING THE TORCH TO AN UPRIGHT POSITION AND PROCEED TO CUT.
1 TO START A PIERCE, TILT THE TORCH TO PREVENT MOLTEN MATERIAL FROM COMING BACK AGAINST AND DAMAGING THE TORCH.

Figure 3-4. Piercing Technique using the PT-27

3.4 COMMON CUTTING PROBLEMS

Listed below are common cutting problems followed by the probable cause of each. If problems are determined to be caused by the PCM-875, refer to the maintenance section of this manual. If the problem is not corrected after referring to the maintenance section, contact your ESAB distributor.

A. Insufficient Penetration.

1. Current too low.
2. Cutting speed too fast.
3. Damaged cutting nozzle.
4. Improper air pressure.
5. Low air flow rate.

B. Main Arc Extinguishes.

1. Cutting speed too slow.
2. Worn electrode.

C. Dross Formation. (In some materials and thicknesses, it may be impossible to get dross-free cuts.)

1. Current too low.
2. Cutting speed too fast or too slow.
3. Improper air pressure.
4. Faulty nozzle or electrode.
5. Low air flow rate.

D. Double Arcing. (Damaged Nozzle Orifice.)

1. Low air pressure.
2. Damaged cutting nozzle.
3. Loose cutting nozzle.
4. Heavy spatter accumulation on nozzle.

E. Uneven Arc.

1. Damaged cutting nozzle or worn electrode.

F. Unstable Cutting Conditions.

1. Incorrect cutting speed.
2. Loose cable or hose connections.
3. Electrode and/or cutting nozzle in poor condition.

G. Main Arc Does Not Strike.

1. Worn electrode.
2. Loose connections.
3. Worn cable not attached.

H. Poor Consumable Life.

1. Improper gas pressure.
2. Contaminated air supply.
3. Low air flow rate.

4.1 GENERAL

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

WARNING

Be sure that the wall disconnect switch or wall circuit breaker is open before attempting any inspection or work inside of the PCM-875.

4.2 INSPECTION AND CLEANING

Frequent inspection and cleaning of the PCM-875 is recommended for safety and proper operation. Some suggestions for inspecting and cleaning are as follows:

A. Check work cable for secured connection to workpiece.
B. Check safety earth ground at workpiece and at power source chassis.
C. Check heat shield on torch. It should be replaced if damaged.
D. Check the torch electrode and cutting nozzle for wear on a daily basis. Remove spatter or replace if necessary.
E. Make sure cable and hoses are not damaged or kinked.
F. Make sure all plugs, fittings, and ground connections are tight.
G. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the PCM-875 using low-pressure dry compressed air.

CAUTION

Water or oil occasionally accumulates in compressed air lines. Be sure to direct the first blast of air away from the equipment to avoid damage to the PCM-875.

H. Occasionally, bleed all water from the filter beneath the air filter-regulator.

4.3 PT-27 TORCH CONSUMABLE PARTS

WARNING

Make sure power switch on PCM-875 is in OFF position before working on the torch.

WARNING

The PT-27 torch head contains a gas flow check valve that acts in conjunction with the flow switch and circuitry within the power source. This system prevents the torch from being energized with high voltage if the torch switch is accidentally closed when the shield is removed. Always replace torch with the proper torch manufactured by ESAB since it alone contains ESAB¹s patented safety interlock.

To assemble the consumable parts, refer to Figure 4-1.

A. Place nozzle, swirl baffle and electrode into the shield as shown.

B. Thread assembly to the torch body and hand tighten. **Always make sure the shield is very tight before cutting.**

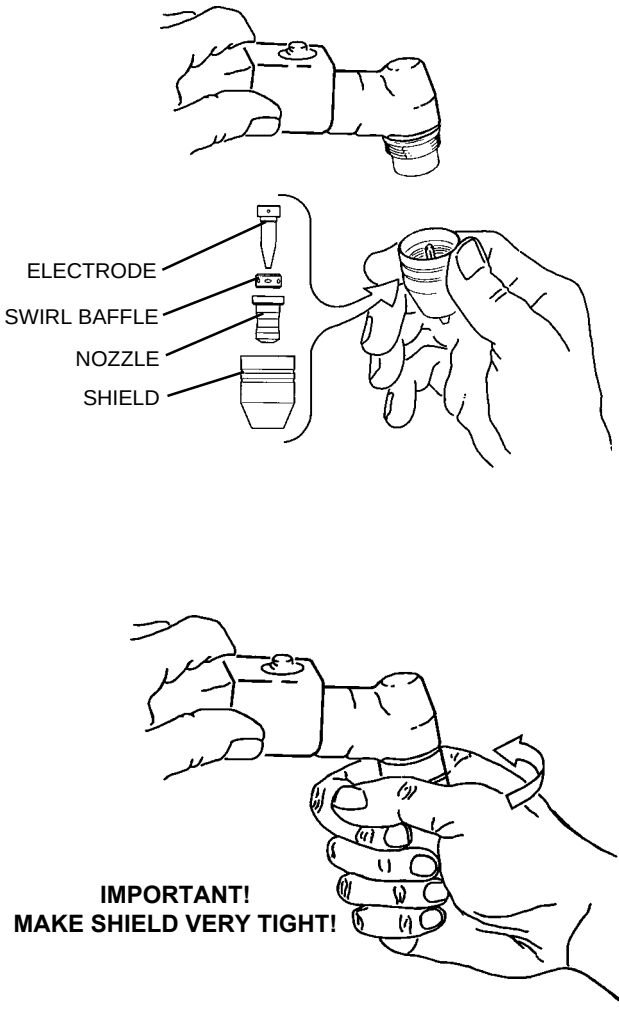


Figure 4-1. Assembly of PT-27 Torch Front End Parts

4.4 FLOW SWITCH (FIGURE 4-2)

When excessive contamination is found in the air, the flow switch (FS-4) should be disassembled and cleaned as follows:

A. Ensure the system is shut down and there is no trapped air under pressure in the piping.
B. Remove the piston plug.
C. Remove the spring. Use care when handling spring to prevent distortion.
D. Remove the piston.
E. Clean all parts with cleaning agent.

NOTE

Ensure cleaning agent does not contain solvents which can degrade polysulfone. Warm water and detergent is recommended for cleaning. Allow all parts to dry thoroughly before reassembly.

Reassemble the flow switch in reverse order.

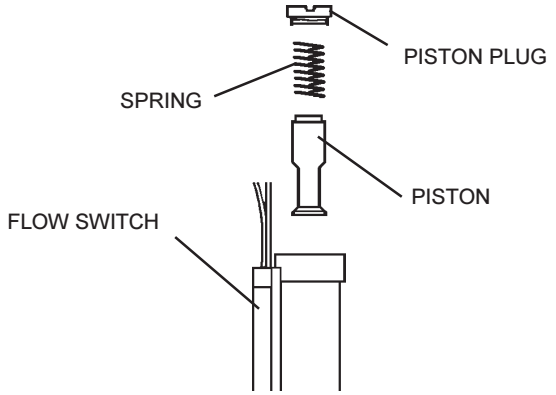


Figure 4-2. Disassembly / Assembly of Flow Switch

4.5 IGBT Handling & Replacement

Since IGBT gates are insulated from any other conducting region, care should be taken to prevent static build up, which could possibly damage gate oxides. All IGBT modules are shipped from the factory with conductive foam contacting the gate and emmiter sense pins.

Always ground parts touching gate pins during installation. In general, standard ESD precautlions application to FETs should be followed.

Other handling precautions that should also be observed are as follows:

- Use grounded work station with grounded floors and grounded wrist straps when handling devices.
- Use a 100Ω resistor in series with the gate when performing curve tracer tests.
- Never install devices into systems with power connected to the system.
- Use soldering irons with grounded tips when soldering to gate terminals.

When mounting IGBT modules on a heatsink, certain precautions should be taken to prevent any damage against a sudden torque. If a sudden torque (“one-sided tightening”) is applied at only one mounting terminal the ceramic insulation plate or silicon chip inside the module may get damaged.

The mounting screws are to be fastened in the order shown in Figure 4-3. Also, care must be taken to achieve maximum contact (i.e. minimum contact thermal resistance) for the best heat dissipation.

Application of a thermal pad on the contact surface improves it thermal conductivity. See Replacement Parts section for the required pad.

A torque wrench should be used. Tighten mounting screws to 28 in-lbs; wire connecting screws to 19 in-lbs. If torque is too heavy, the device can damage like the above “one-sided tightening”.

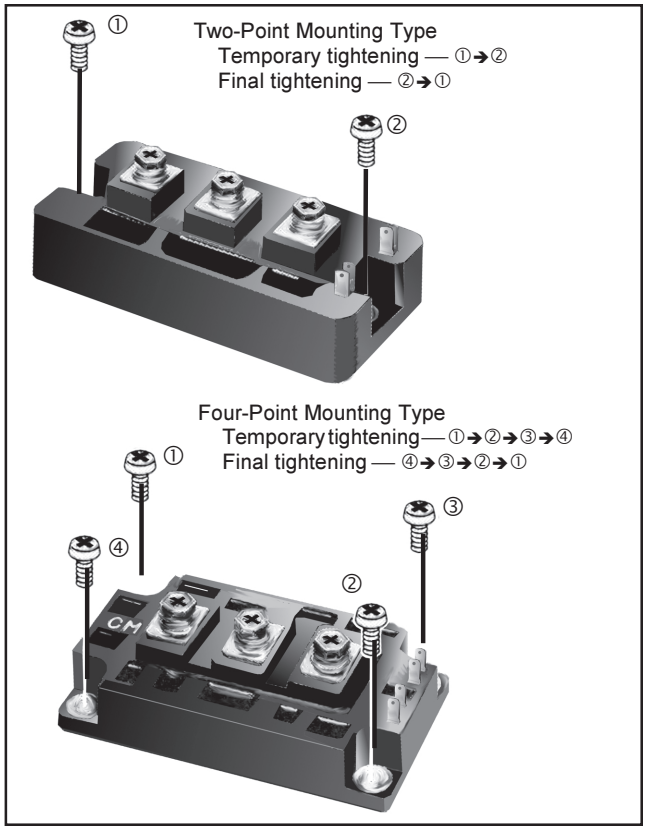


Figure 4-3. Screw Fastening Order

5.1 TROUBLESHOOTING

WARNING

ELECTRIC SHOCK CAN KILL! Be sure that all primary power to the machine has been externally disconnected. Open the line (wall) disconnect switch or circuit breaker before attempting inspection or work inside of the power source.

Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for secure terminal connections, loose or burned wiring or components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can be found by referring to the sequence of operations and electrical schematic diagram (Figure 5-1) and checking the various components. A volt-ohmmeter will be necessary for some of these checks.

WARNING

Voltages in plasma cutting equipment are high enough to cause serious injury or possibly death. Be particularly careful around equipment when the covers are removed.

NOTE

Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

5.2 TROUBLESHOOTING GUIDE

A. Power Light (PL1) does not come on.

1. Visually inspect the machine for any damage.
2. Check if the cooling fan is running. If not, then check the following :
   a. Check if the machine power cord is plugged to the input power receptacle.
   b. Measure the input power at the receptacle. If not present, then check the wall disconnect switch and it's fuses.
   c. Check Fuse (F1). If fuse is ok, then check the input circuit breaker (CB1) for proper operation. Replace if defective.
3. If above items check OK , the problem is internal. Send unit to an Authorized Repair Station for repair.
   a. If the cooling fan is running, then measure voltage between pins P2-11 and P2-14 of the control board (should be 115 VAC). If there is no voltage, then replace transformer T2.
   b. If the voltage is present, then the pilot light may be burnt out.

B. No Air Flow

A. Check air inlet supply. Unit requires 320 CFH at 65 psig.

B. Check air hose and connections. Tighten if leaking.

C. Does air flow when "air test" switch is in test position?
   a. If not, check torch consumables, replace if necessary.
   b. If above items check OK , the problem is internal. Take unit to an Authorized Repair Station for repair.

C. The Power light is on, but nothing happens when the torch switch is depressed. Fault light does not activate.

NOTE: Unplug high frequency connection before attempting to work on this problem.

1. Check the Pilot Arc fuse (F2) located on the rear panel. An open fuse will indicate a short in the torch. If the fuse is all right, then check the following:

   a. With the machine power on, depress the torch switch. On the control board the LED 1 should be lit as long as the switch is depressed. If not then check:

      i. Turn power off to the machine. Unplug Control board. Put an ohmmeter across P5-1 and P5-2 to take resistance reading. Depress torch switch. Meter should read a short. If not, then one of the following is not working properly:

      ii. Torch switch or the leads. Unplug the torch switch leads at the machine. Put a meter across the two plug pins. Should read a short when the torch switch is depressed. If not, then either broken switch leads or malfunctioning switch.

   b. Check T2 transformer secondary voltages at the plugs P1 and P2. Refer to system schematic. Replace the transformer if the correct secondary voltages are not present.

   c. If everything above checks out all right, then the PCB1 Control Board should be replaced.

D. Fault light activates when torch switch is closed.

The Fault circuit is used to monitor conditions necessary for the safe operation of the PCM-875. The fault light will glow amber under the following conditions and operations will come to a complete stop:

1. **High/Low line voltage**. The Fault Light will **rapidly blink on and off** (5 times per second). This indicates that the input voltage is outside the "+" or "-" 15% safe operating range rating.

2. **Flow fault** - The fault light will be **mostly on** but will blink off for 1/10th of a second every second. This indicates that the air flow is low.
   a. Check the air pressure at the machine regulator. It should be adjusted to 65 psig. If no air pressure, check the air at the supply point. Also, check for any obstructions in the air hose.
   b. Air flow may be blocked at the torch tip. Check the torch consumables. Also check for any obstructions in the torch leads.

   NOTE: If above items check OK , the problem is internal. send unit to an Authorized Repair Station for repair.

   c.. Put the 'Air Check' switch to On position. Air should flow through torch. If not, then the flow switch may be stuck due to oil in the air. Clean air flow switch per supplier's instructions or replace switch. To check if the flow switch is open, put voltmeter leads between P1-12 and P1-1. It should read about 12 VDC. When the flow switch closes, the voltage will drop to zero volts.
   d. Air Check switch may also be malfunctioning if the air is flowing continuously or putting in the On position does not turn air on.

3. **Over Temperature.** The fault light will be **mostly off** but will blink on for 1/10 of a second, every second. This generally indicates that the duty cycle has been exceeded. Allow the power source to cool before returning to operate.

   a. Thermal switch may be open. It will open if the temperature at the IGBT base reaches 94^{O}C. With the machine power off, check the continuity between P1-1 and P1-2 of the control board. If the switch is OK, then

the ohmmeter should read a direct short. If not then it should read open.

b. If the switch is malfunctioning, replace it. Clean the surface of the heat sink before installing the switch.

4. **Over Current**. The fault light will be on **continuously**. This indicates that the input current to the main transformer has exceeded preset limits.

   a. To check if the output is shorted, measure the resistance by putting the ohmmeter leads (make sure to disconnect HI Frequency leads):"+" of the meter to Torch "+" output terminal and Work "-" lead of the meter to the "-" output terminal. Reading should be about 2 K Ohms. Reverse the voltmeter leads, the resistance reading should be less than 1.5 K Ohms.
   b. If the resistance reading is different than above, check the torch, the output bridge and Filter Board (PCB-5).

E. Air is On but nothing happens when torch switch is operated.

1. Check the pilot arc fuse located on the rear panel. If it is open, nothing will happen when the torch switch is depressed.

2. Check the torch. Make sure the heat shield is very tight.

3. Check to assure high frequency is present at the torch. If not, then listen for high frequency at the high frequency generator. It is located on the bottom/right side of the unit. The high frequency gap is set to .040". **Disconnect HI FREQUENCY leads**. Check for 115 volt supply to the high frequency unit between P2-12 & P2-13 of the control board with torch switch closed.

4. With HI FREQUENCY leads disconnected, measure open circuit voltage. It should be 275 VDC between "Work" and "Torch" terminals. If it is not present then any one of the following may not be working properly:

   a. Check the operation of the Thermal Switch. See D.3.a. above.

   b. Check Air Check switch operation. It might be stuck in On position. Pilot arc will not initiate if this switch is in the ON position. (safety reasons)

   c. Check air flow switch. There may be internal short. See D.2.c above.

   d. Measure voltage across C1 or C2 capacitor. It should be as follows:

      approx. 325 VDC for the 208/230 volt unit.
      approx. 280 VDC to 325 VDC for the 400 or 460 volt unit
      approx. 410 VDC for the 575 volt unit

      If not, one of following could be malfunctioning:

      1). Check the capacitors C1 and C2 for any damage.

      2.) Check input bridge/SCR Module (IBR) This can be checked without taking it out of the circuit using an volt/ohmeter. Replace it if found malfunctioning. Follow bridge installation instructions.

      3.) Check Inrush current resistor, R10 and SCR1. Both are located on the input bridge heat sink. Replace it if malfunctioning.

   e. IGBTs (2 on 230 V, and 1 on the 400 V & 460 V units) may be blown. See IGBT installation procedure. Before replacing IGBTs, make sure to check the zener diodes and pico fuses on the IGBT driver boards.

F. High Frequency and Pilot Arc are on but Main Arc does not transfer.

1. Make sure work clamp is connected to work material.
2. Check the torch. Replace consumables if necessary.
3. Make sure the current setting potentiometer is set above 10 amps. If it is, set below 10 amps, then HI FREQUENCY will go on and off at 5 sec intervals.

G. Poor Cutting Performance.

1. Check air supply regulator . It should be adjusted to 65-75 psig.
2. The air supplied to the torch should be free of oil and water.
3. Make sure the consumables in the torch are acceptable.
4. Check open circuit voltage. See E.4 above.
5. Check the output. Use a calibrated current probe capable of measuring 100 amps in the presence of high frequency.

H. Air does not shut off.

1. Check air test, the gas solenoid valve is energized when the switch is in the “on” position.
2. Does air flow stop when the torch switch is unplugged? If yes, check and repair the torch. If not, send unit to an Authorized Repair Station for repair.
    a. Check voltage to solenoid coil, if present when torch switch is unplugged, replace PCB1. If voltage is “0”, replace solenoid valve.

I. Main arc is difficult to start.

1. The most common reason is worn or missing consumables. Check and replace if necessary.
2. Input air must be clean and dry.
3. Input air pressure must be between 65 - 75 psig.
4. Torch connections must be tight.
5. Work cable and clamp must be in good condition and must make a good electrical connection to the material to be cut.
6. If above items check OK , the problem is internal. send unit to an Authorized Repair Station for repair.
    a. Missing or weak pilot arc. Check pilot arc fuse, open circuit voltage, pilot arc resistors and pilot arc wiring.
    b. Inoperative starter board (PCB-5).

5.3 REFERENCE VOLTAGE CHECKS

A. Control Board Assembly (PCB1)

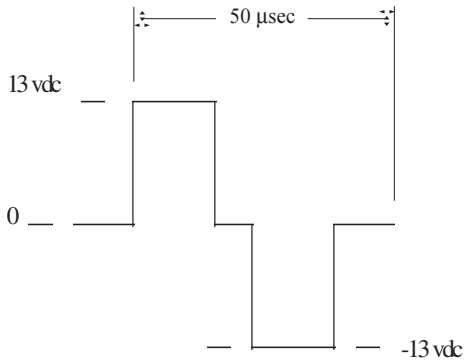
1. **LED's**

LED-1 - Torch Switch
LED-2 - High Frequency
LED-3 - Gas Solenoid Valve

2. **Voltage Test Points**

Tests are made with power on - no arc.
Disable High Frequency by disconnecting blue wire with black sleeve

TP-0 - Ground
TP-1 - +15 vdc
TP-2 - +12 vdc
TP-3 - -12 vdc
TP-4 - +5 vdc
TP-9 - IGBT's driving signal - switching frequency = 20 KHz
TP-10 - IGBT's driving signal - switching frequency = 20 KHz

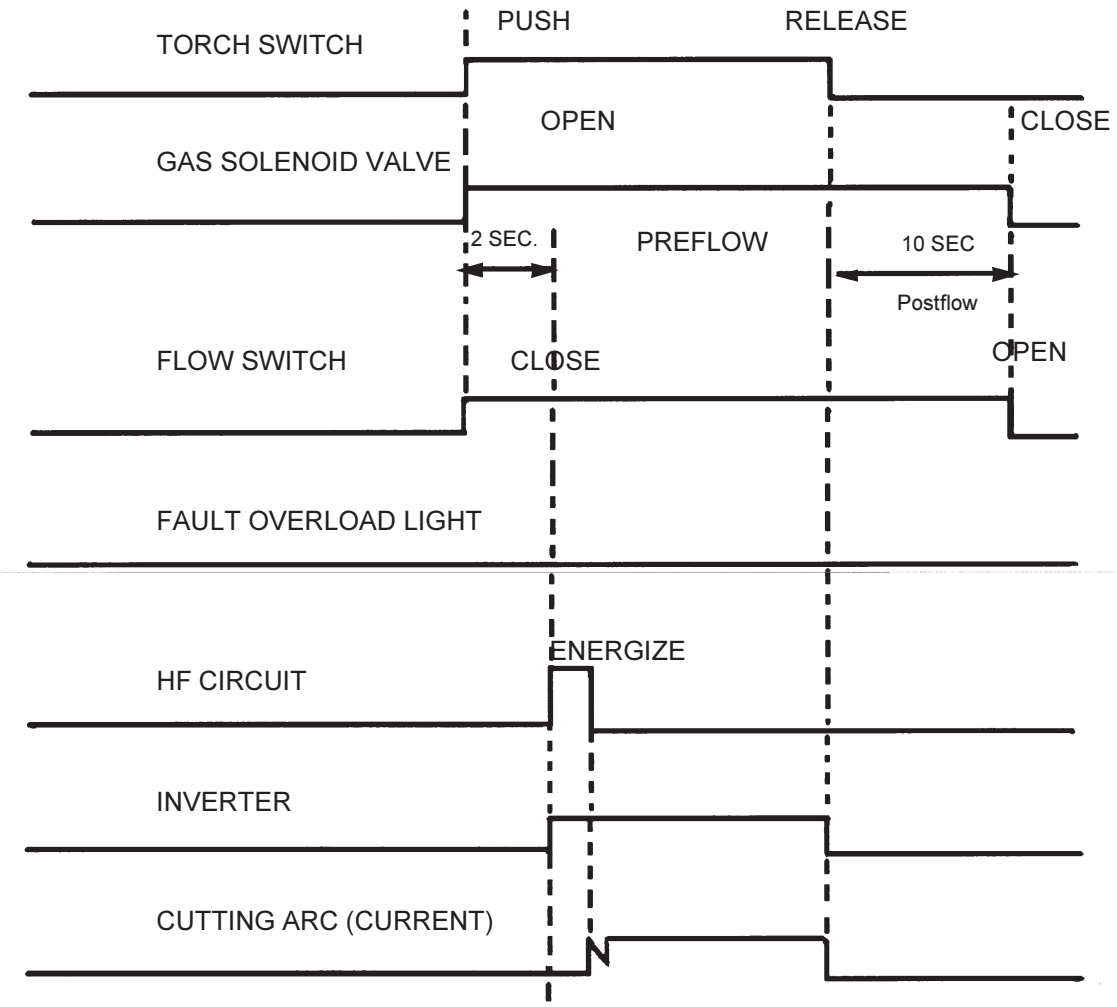


For 208/230 VAC input, the IGBT off time is 3µsec.
For 400/460/575 VAC input, the IGBT off time is 6µsec.

Figure 5.1 IGBT Gating Signal

5.4 SEQUENCE OF OPERATION

A. TRIGGER LOCK "UNLOCK" position

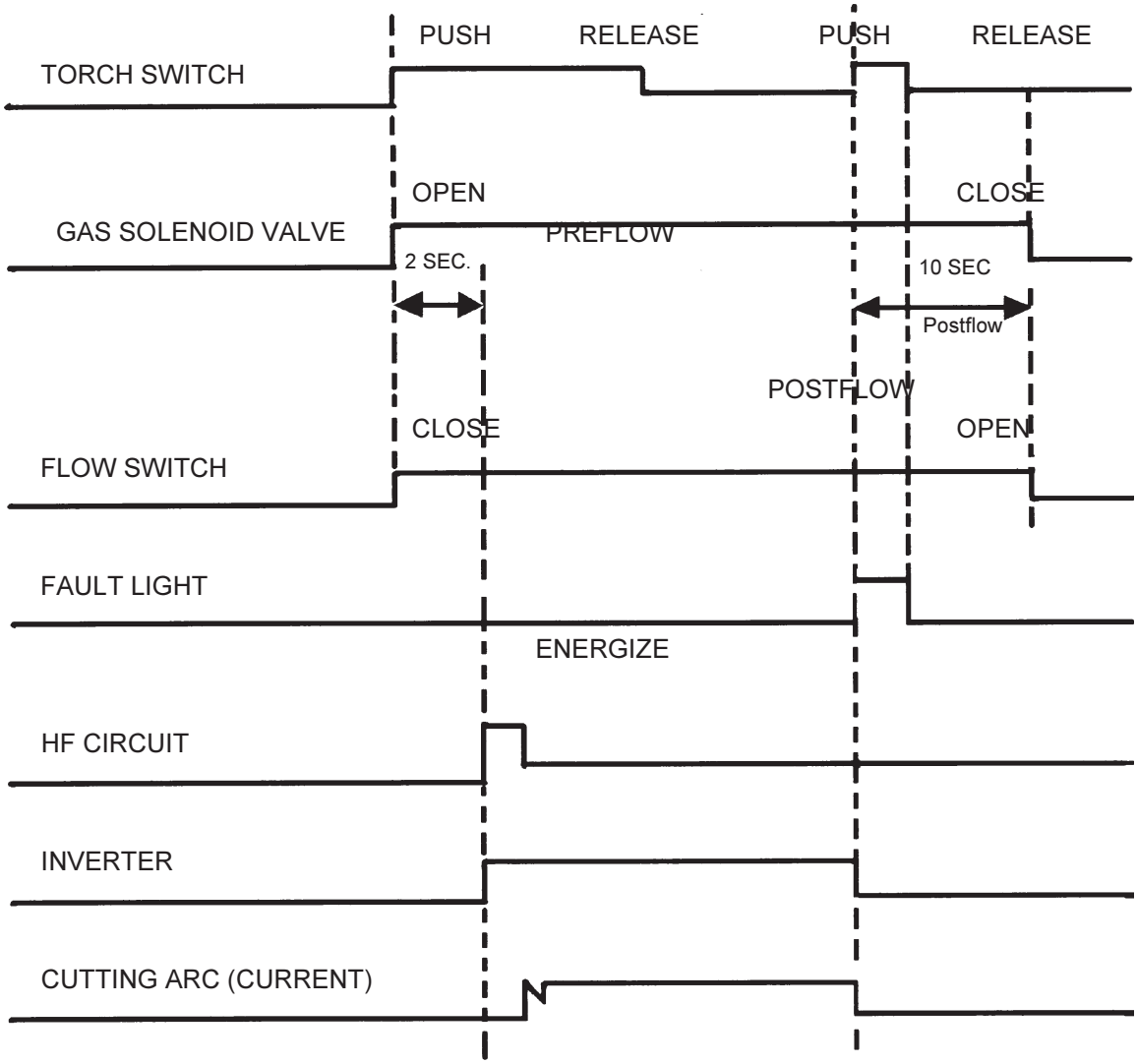


NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.

2. When the amber fault light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.

B. TRIGGER LOCK "LOCK" position



NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.

2. When the red fault light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.

3. FAULT light is on during second "turn-off" trigger only. This does not affect performance in any way.

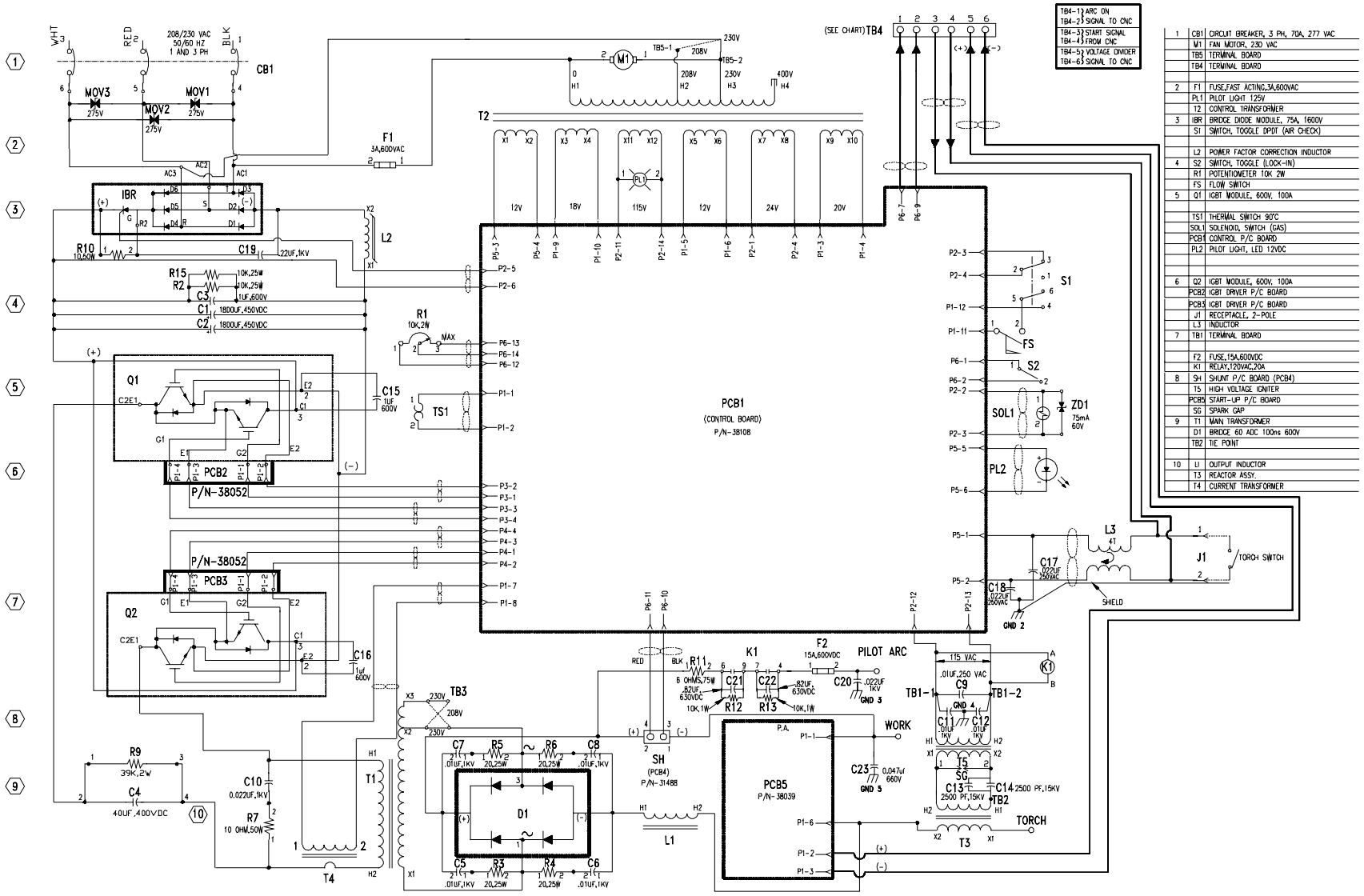


Figure 5-1. Schematic Diagram, PCM-875, 208/230 V, 50/60 Hz, 1 or 3-Phase

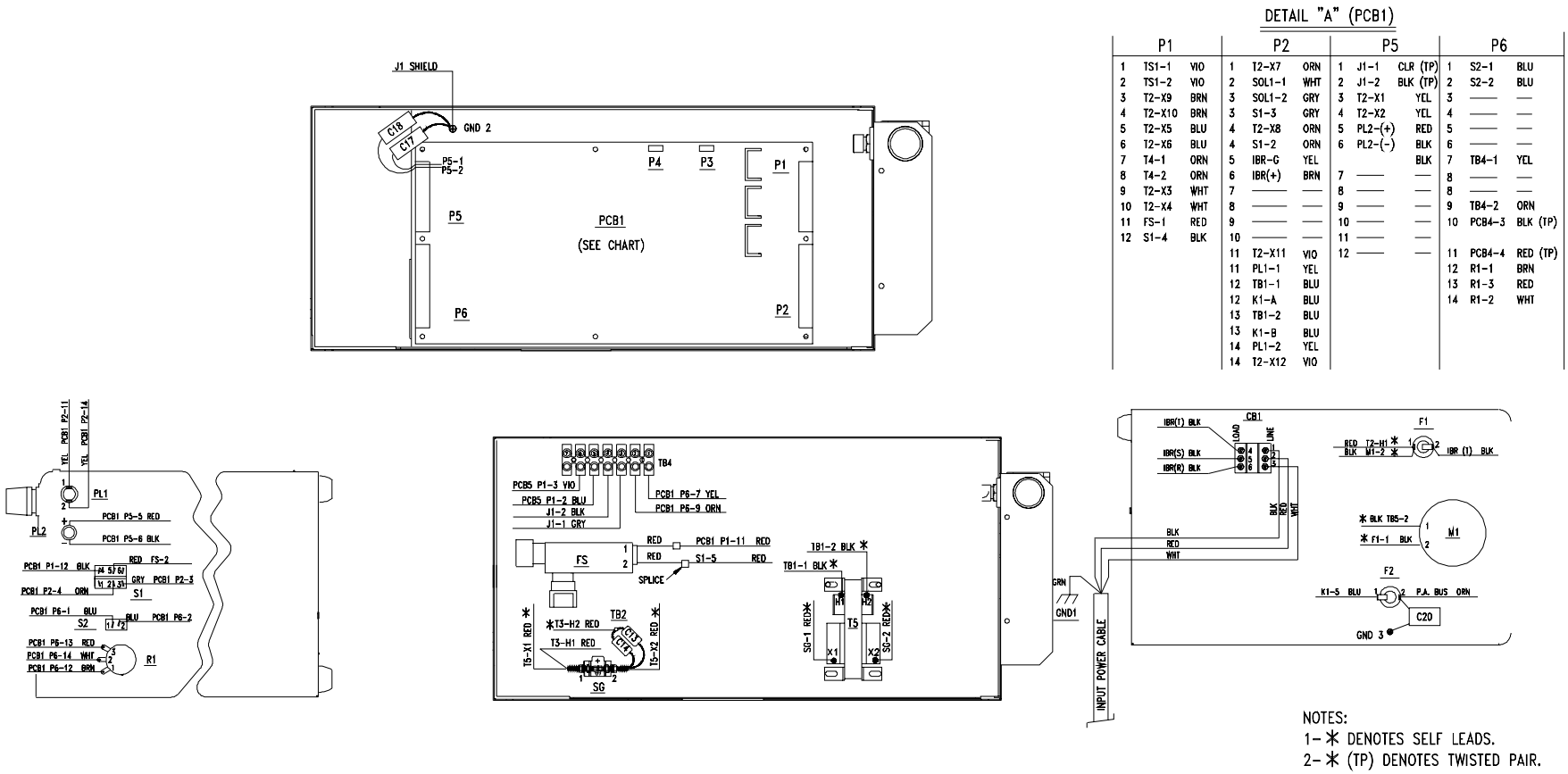


Figure 5-2. Wiring Diagram (Sheet 1 of 2), PCM-875, 208/230 V, 50/60 Hz, 1 or 3-Phase

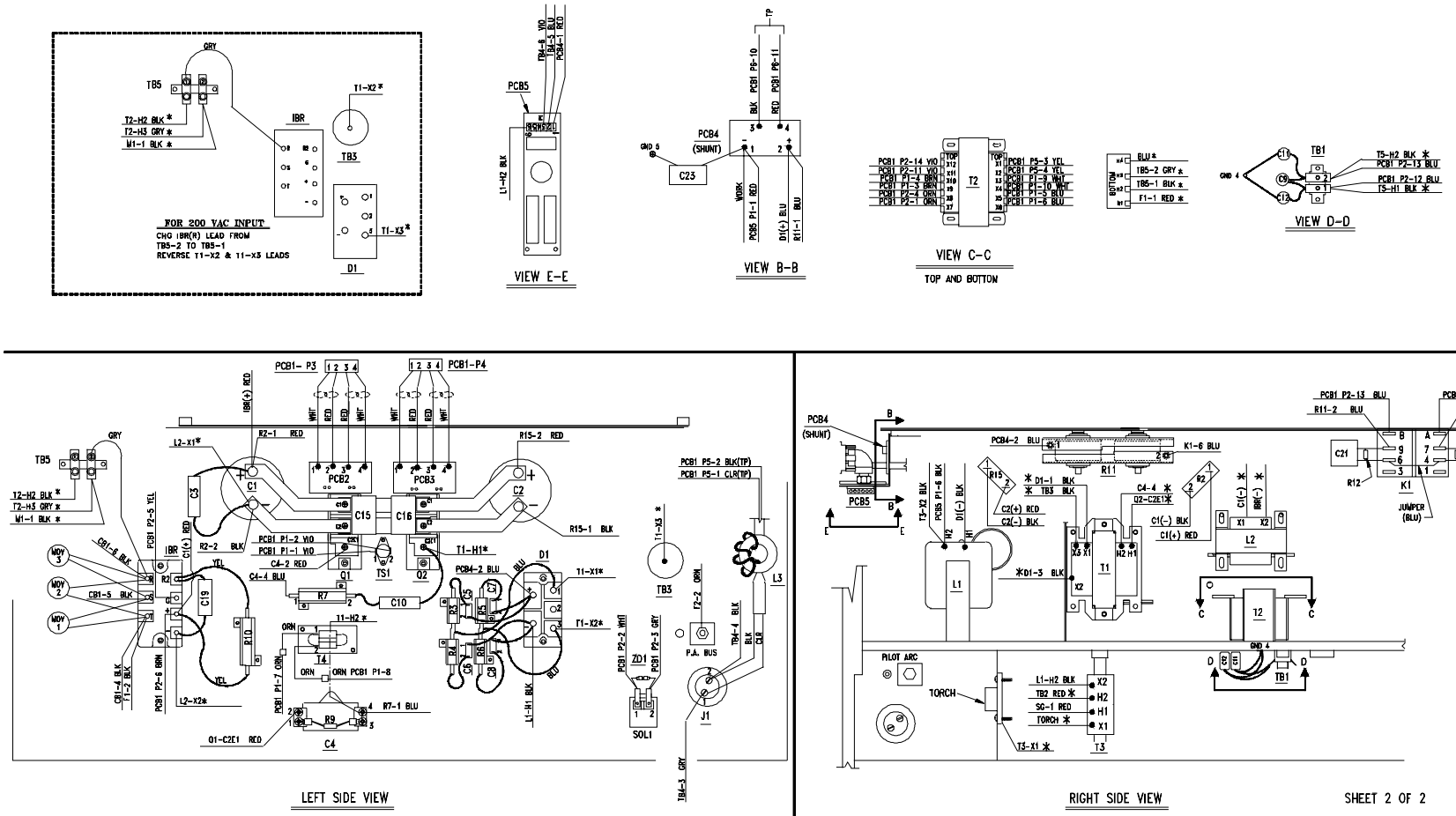


Figure 5-3. Wiring Diagram (Sheet 2 of 2), PCM-875, 208/230 V, 50/60 Hz, 1 or 3-Phase

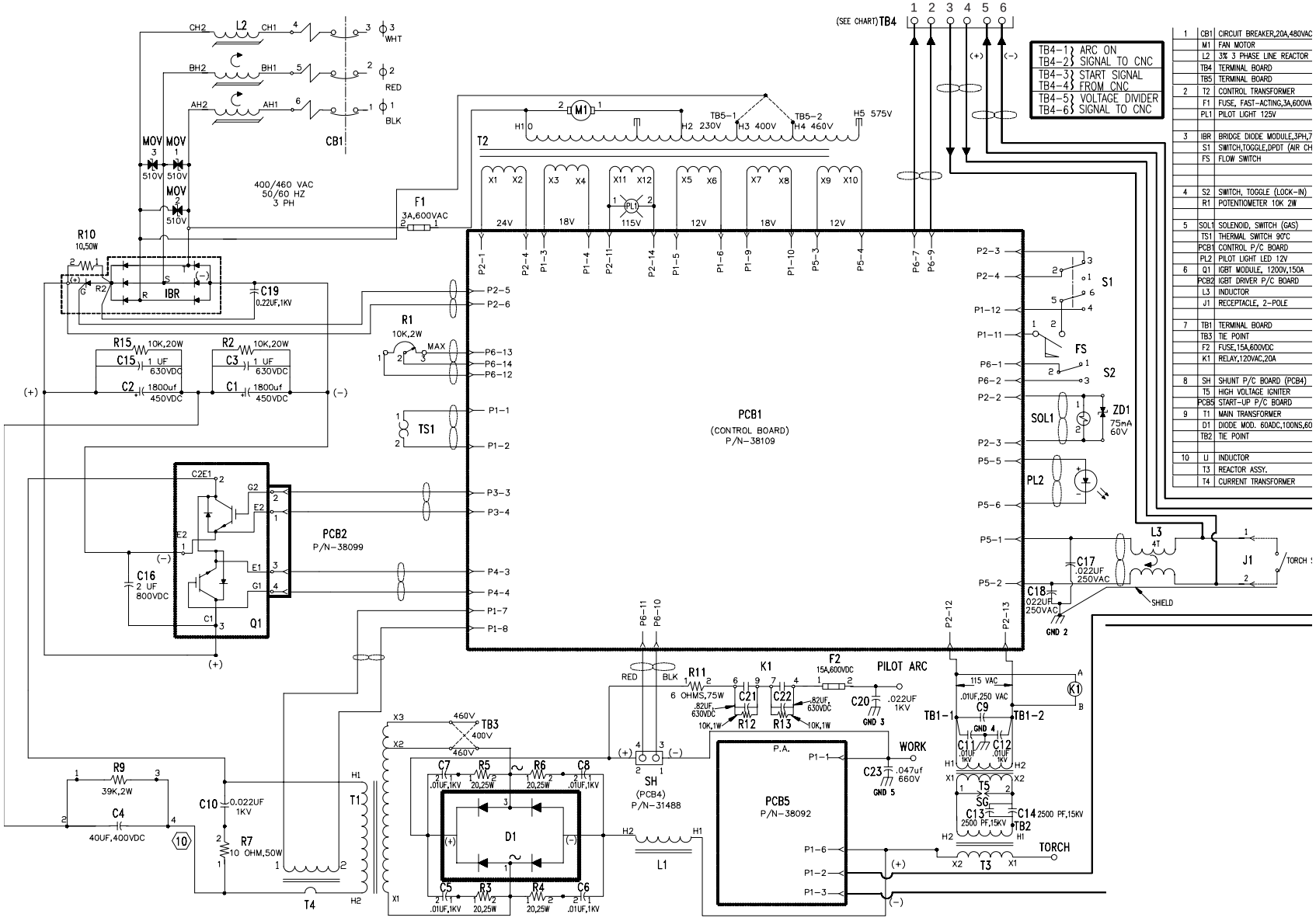


Figure 5-4. Schematic Diagram, PCM-875, 400/460 V, 50/60 Hz, 3-Phase

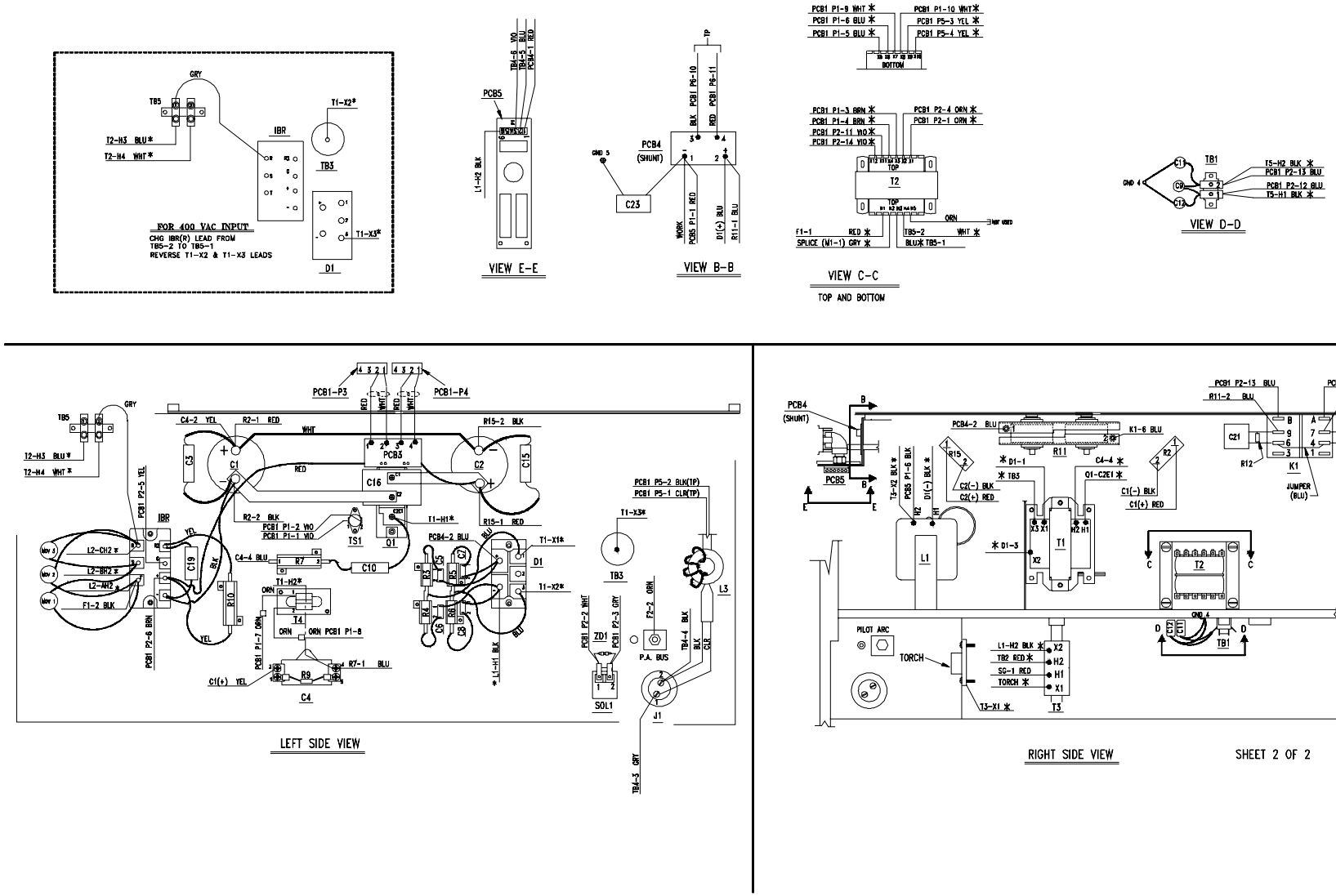


Figure 5-5. Wiring Diagram (Sheet 1 of 2), PCM-875, 400/460 V, 50/60 Hz, 3-Phase

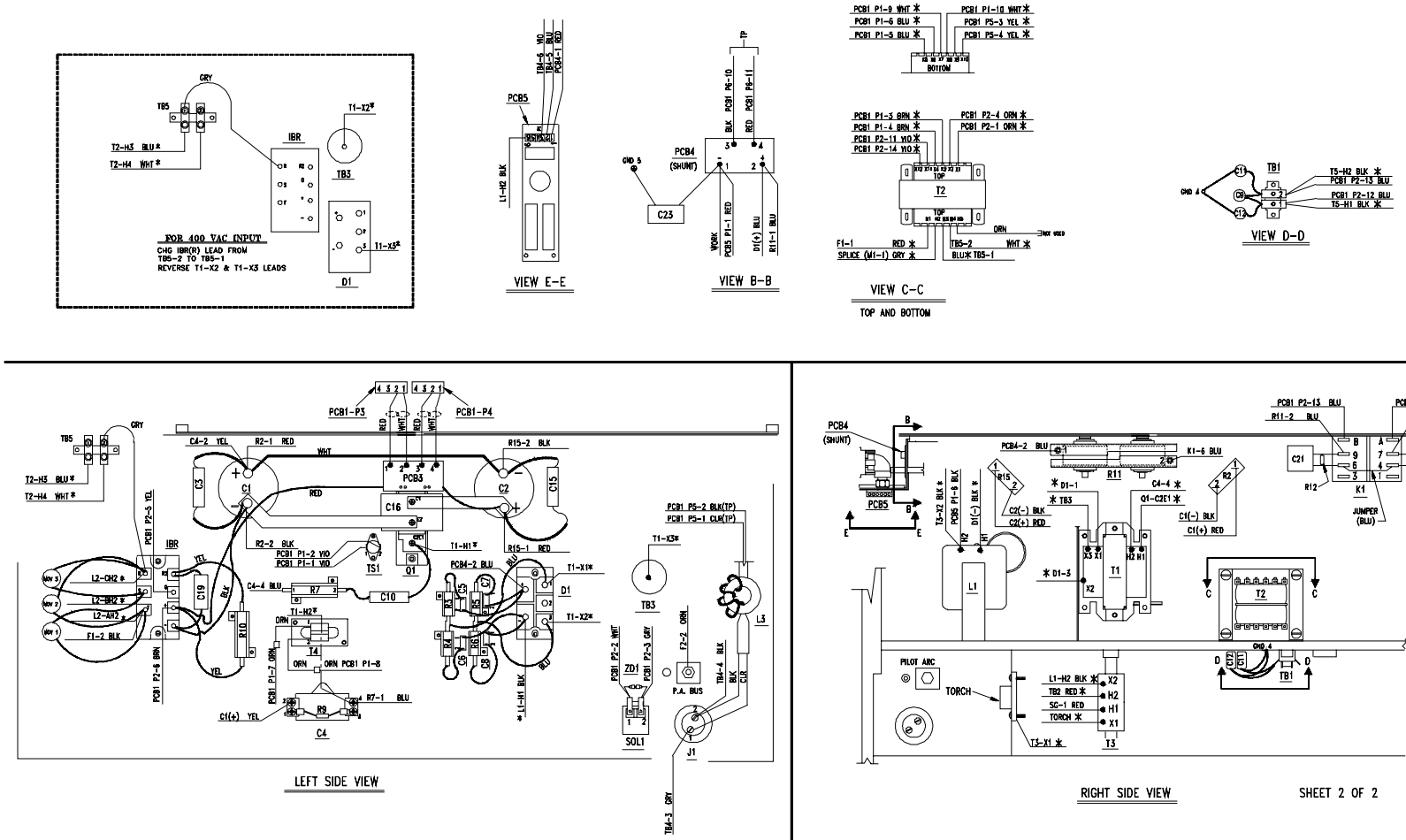


Figure 5-6. Wiring Diagram (Sheet 2 of 2), PCM-875, 400/460 V, 50/60 Hz, 3-Phase

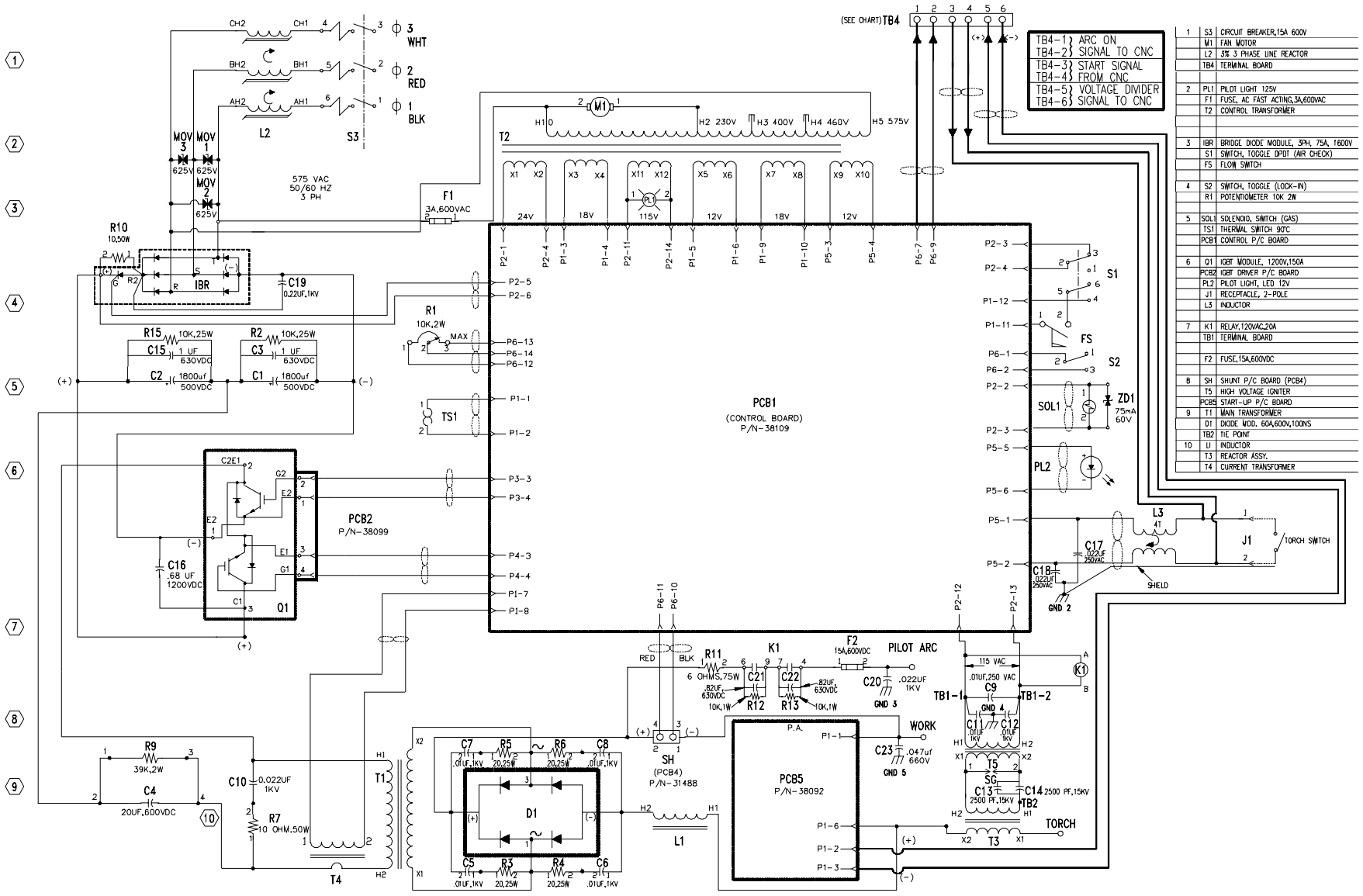


Figure 5-7. Schematic Diagram, PCM-875, 575 V, 60 Hz, 3-Phase

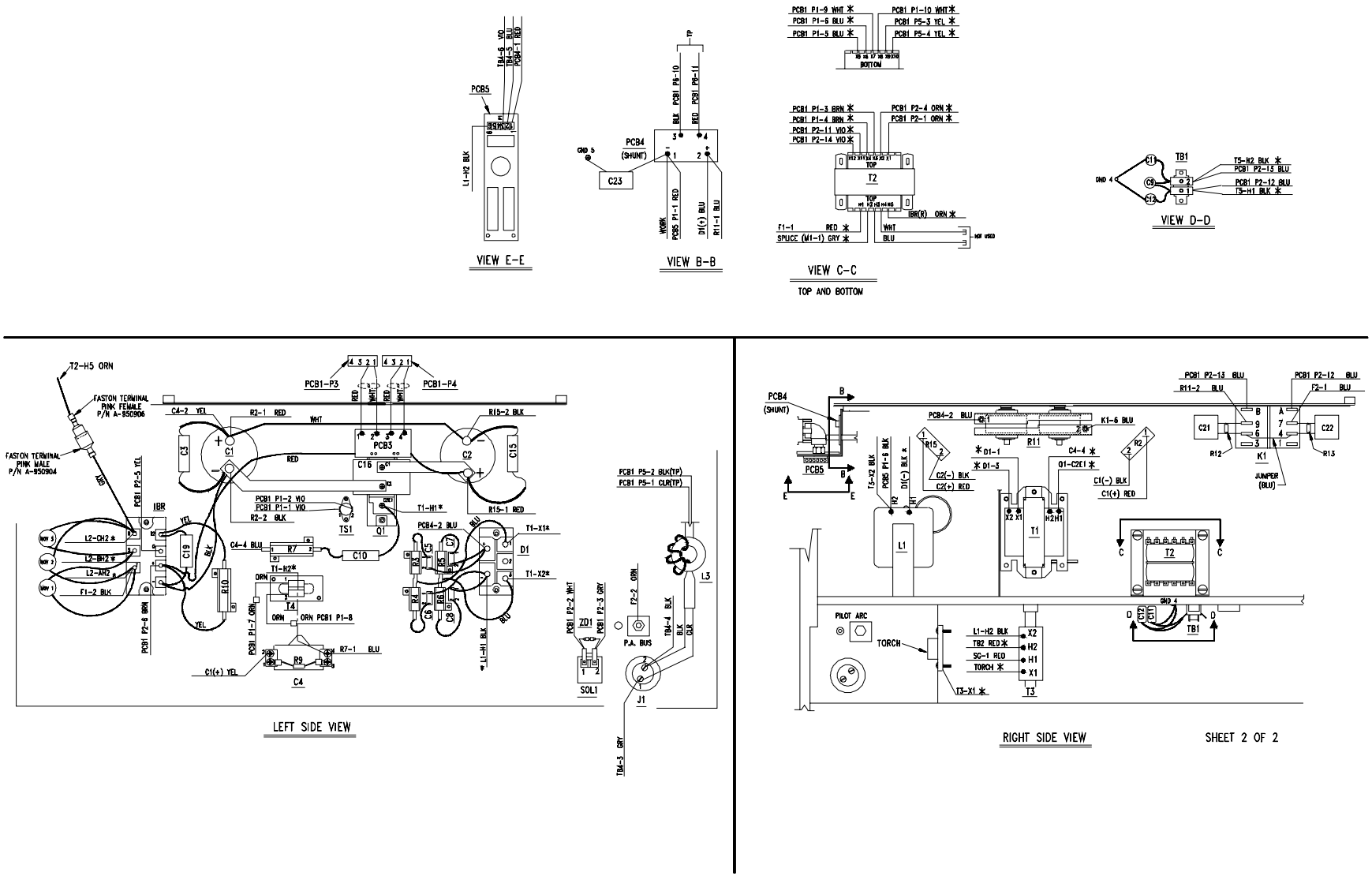


Figure 5-8. Wiring Diagram (Sheet 1 of 2), PCM-875, 575 V, 60 Hz, 3-Phase

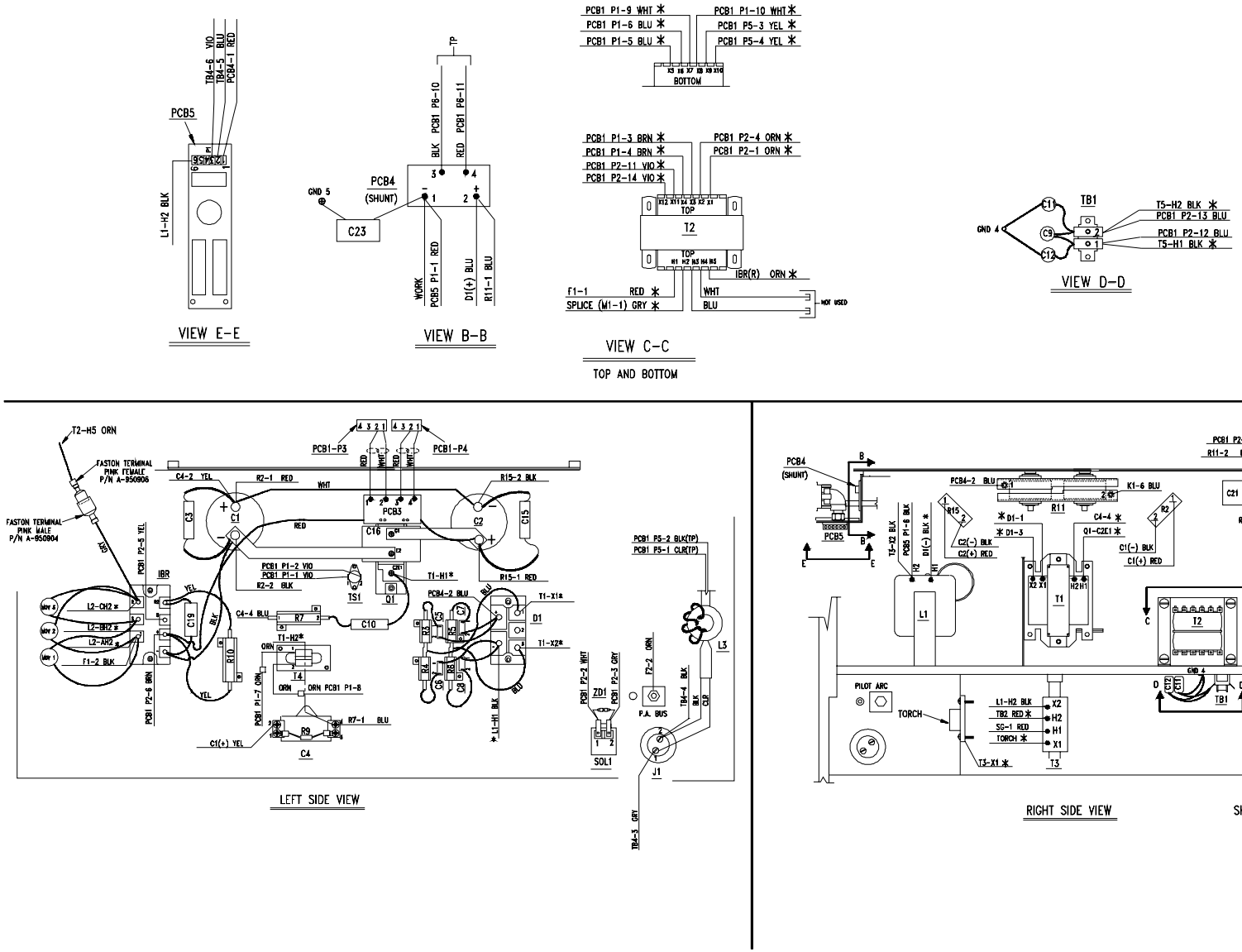


Figure 5-9. Wiring Diagram (Sheet 2 of 2), PCM-875, 575 V, 60 Hz, 3-Phase

6.1 GENERAL

Replacement Parts are illustrated on the following figures. When ordering replacement parts, order by part number and part name, as illustrated on the figure.

208/230 V, 50/60 Hz, 1 or 3-phase ..... P/N 36580
460 V, 50/60 Hz, 3-phase ..... P/N 36584
575 V, 60 Hz, 3-phase ..... P/N 36713
400 V, 50/60 Hz, 3-phase ..... P/N 36724

Always provide the series or serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

6.2 ORDERING

To assure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.

Replacement parts may be ordered from your ESAB distributor or from:

ESAB Welding & Cutting Products
Attn: Customer Service Dept.
P.O. Box 100545, 411 S. Ebenezer Road
Florence, SC 29501-0545

Be sure to indicate any special shipping instructions when ordering replacement parts.

To order parts by phone, contact ESAB at 1-843-664-5540. Orders may also be faxed to 1-800-634-7548. Be sure to indicate any special shipping instructions when ordering replacement parts.

Refer to the Communication Guide located on the last page of this manual for a list of customer service phone numbers.

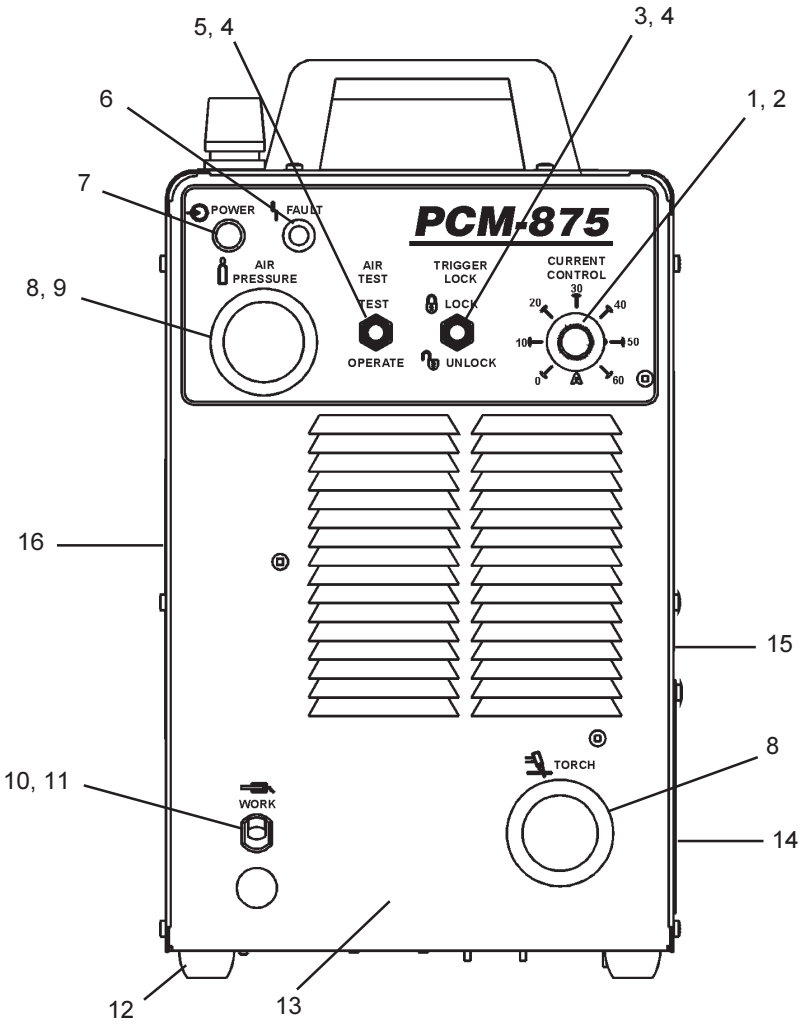


Fig. 6-1. PCM-875 Power Source, Front View

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
1	1	137630611	KNOB	
2	1	2062018	POT. 10K 2W (NOMEX INSUL. - 676876)	R2
3	1	673213	SWITCH TOGGLE SPST 2 POS 15 A 125 V	S2
4	2	951474	SWITCH SEAL BLACK	
5	1	634518	SWITCH TOGGLE DPDT 2 POS 15 A 125 V	S1
6	1	951754	LAMP LED YEL 12 V	PL2
7	1	951526	LAMP NEON WHITE	PL1
8	2	993426	GROMMET RUBBER 1.50 ID x 1.76 OD	
9	1	21711	GAUGE 1.50 160 PSI WHITE	
10	1	23602576	STRAIN RELIEF HEYCO #1214	
11	1	680560	WORK CABLE 25 FT. (Not Shown)	
12	4	182W12	FOOT RUBBER	
13	1	32237GY	CHASSIS PCM-875	
14	1	36330YL	DOOR ACCESS YEL (ESAB)	
15	1	954008	LABEL WARNING HI VOLTAGE	
16	2	13734588	LABEL ESAB	

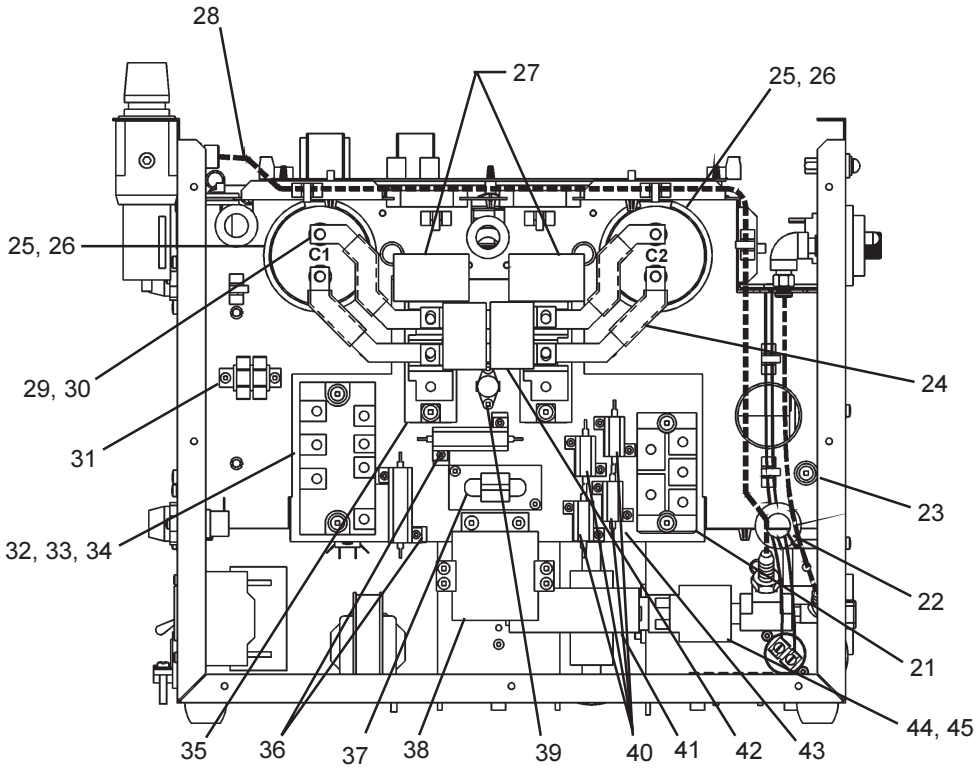


Fig. 6-2. PCM-875 Power Source, Left Side View (208/230)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
21	1	952150	BRIDGE 60ADC 100NS 600 V (includes PAD - 951192)	D1
22	1	952002	CORE SATURABLE	L3
23	1	952208	STANDOFF INS.	TB3
24	1	36731	BUSBAR NEG	
25	2	952237	CAPACITOR 1800 µf 450VDC	C1, 2
26	2	994674	GROMMET STRIP	
27	2	38052	PCB ASS'Y 1GBT DRIVER BOARD	PCB2, 3
28	1	36822	HOSE AY B/A-2X 1/4NPT RUB 2 FT	
29	1	36730	BUSBAR POS	
30	1	951028	CAPACITOR 1µf 630VDC (Not shown - see wiring)	C3
31	1	950487	TERM BLOCK 2 POS	TB5
32	1	952235	MODULE INPUT BRIDGE/SCR (includes PAD - 952280)	IBR
33	1	2062282	CAPACITOR .22µf 1KV (See wiring)	C19
34	3	951321	METAL OXIDE VARISTOR 275 V (See wiring)	MOV1, 2, 3
35	2	951205	IGBT 600 V 100 A (includes PAD - 951190)	Q1, 2
36	2	17750010	RESISTOR 50 W 10 OHM (PAD - 951194)	R7, 10
37	1	32958	CURRENT TRANSFORMER ASS'Y	T4
38	1	952255	CAPACITOR 40 µf 400 VDC	C4
39	1	950711	THERMAL SWITCH 194°F	TS1
40	4	17721020	RESISTOR 24 W 20 OHMS (PAD 951193)	R3, 4, 5, 6
41	1	951202	FLOW SWITCH .25 GPM	FS
42	2	951940	CAPACITOR 1µf 630W VDC	C15, 16
43	1	952558	HEATSINK	
44	1	950249	SOL. VALVE 1/4NPT 165 PSI 24 VAC	SOL1
45	1	951471	DIODE ZENER 60 V 75 MA (See Wiring)	ZD1

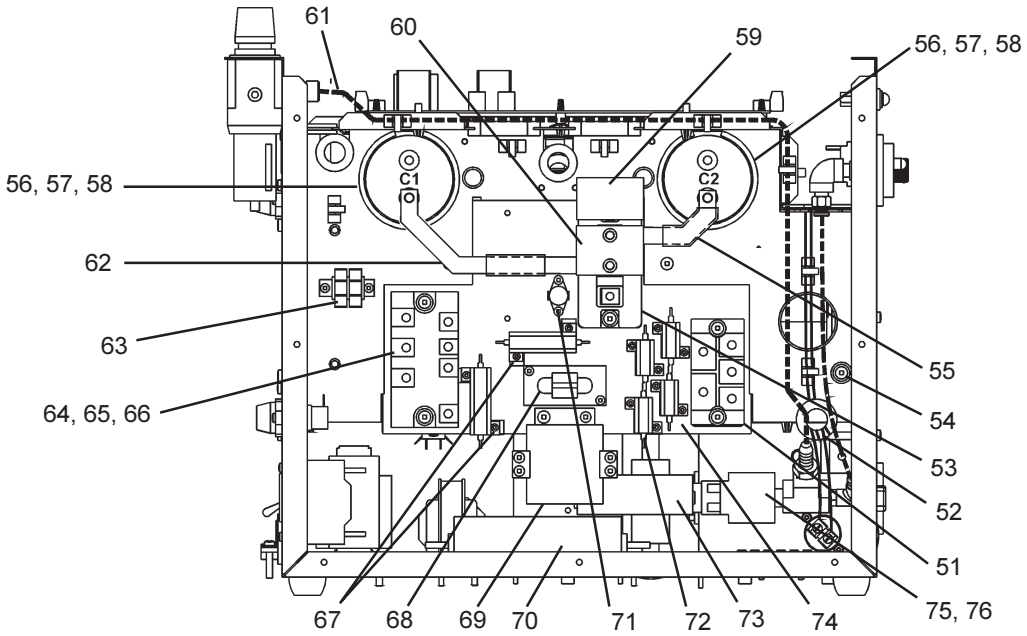


Fig. 6-3. PCM-875 Power Source, Left Side View (400/400CE/460/575)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
51	1	952150	BRIDGE 60 ADC 100NS 600 V (includes PAD - 951192)	D1
52	1	952002	CORE SATURABLE	L3
53	1	951800	MODULE DUAL IGBT 150 A, 1200 V	
			(includes PAD - 951191)	Q1
54	1	952208	STANDOFF INS (Not used on 575 V)	TB3
55	1	36732	BUSBAR POS	
56	2	952237	CAPACITOR 1800µf 450 VDC (400/400CE/460 V)	C1, 2
	2	952562	CAPACITOR 1800µf 500 VDC (575 V)	C2
57	2	994674	GROMMET STRIP	
58	2	951028	CAPACITOR 1µf 630 VDC (See wiring)	C3, 15
59	1	38099	PCB ASS'Y IGBT DRIVER BOARD	PCB2
60	1	951964	CAPACITOR 2µf 800 VDC (400/400CE/460V)	C16
	1	951892	CAPACITOR 0.68µf 1200 VDC (575 V)	C16
61	1	36822	HOSE ASS'Y B/A x 1/4 NPT RUB	
62	1	36733	BUSBAR NEG	
63	1	950487	TERM BLOCK 2 POS (Not used on 400CE/575 V)	TB5
64	1	952235	MODULE INPUT BRIDGE/SCR	
			(includes PAD - 952280)	IBR
65	1	2062282	CAPACITOR .22µf 1KV	C19
66	3	950591	METAL OXIDE VARISTOR 510 V (400/400CE/460 V)	MOV1, 2, 3
	3	951963	METAL OXIDE VARISTOR 625 V (575 V)	MOV1, 2, 3
67	2	17750010	RESISTOR 50W 10 OHM (PAD - 951194)	R7, 10
68	1	32958	CURRENT TRANSFORMER ASS'Y	T4
69	1	952255	CAPACITOR 40µf 400 VDC (400/400CE/460 V)	C4
	1	952585	CAPACITOR 20µf 600 VDC (575 V)	C4
70	1	952253	FILTER EMI (400 V CE only)	FN1
71	1	950711	THERMAL SWITCH 194°F	TS1
72	4	17721020	RESISTOR 25W 20 OHMS (PAD - 951193)	R3, 4, 5, 6
73	1	951202	FLOWSWITCH .25 GPM	FS
74	1	952558	HEATSINK	
75	1	950249	SOL, VALVE 1/4 NPT 165 PSI 24 VAC	SOL1
76	1	951471	DIODE ZENER 60 V 75m A	ZD1

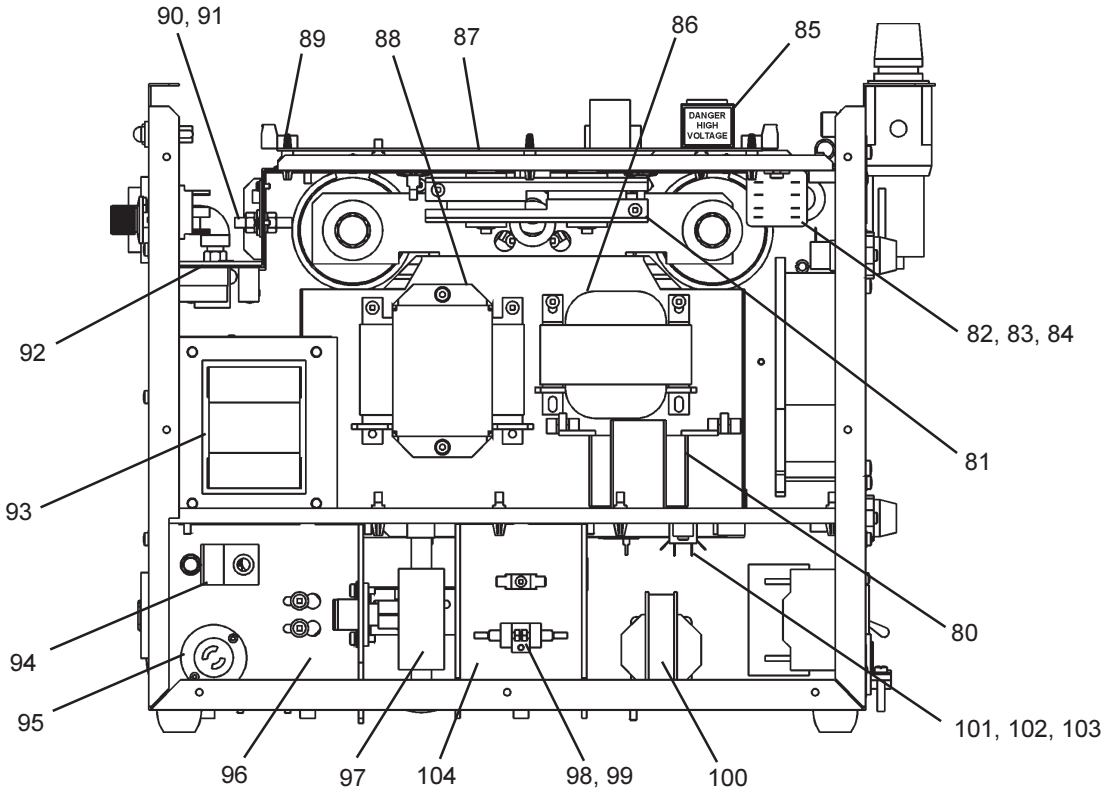


Fig. 6-4. PCM-875 Power Source, Right Side View (208/230)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
80	1	35940	CONTROL TRANSFORMER ASS'Y	T2
81	1	951962	RESISTOR ASS'Y PILOT ARC	R11
82	1	952577	RELAY 25 A 120 VAC	K1
83	2	952557	CAPACITOR .82µf 630 VDC (See Wiring)	C21, 22
84	2	17130310	RESISTOR, 10K OHM 1W (See Wiring)	R12, 13
85	1	23604891	LABEL WARNING HI VOLTAGE RED	
86	1	952232	INDUCTOR PFC	L2
87	1	38108	CONTROL BOARD ASS'Y	PCB1
88	1	36586	MAIN TRANSFORMER ASS'Y	PCB4
89	2	951469	CAPACITOR .022µf 250 VAC (See Wiring)	C17, 18
90	1	31488	SHUNT BOARD ASS'Y	PCB4
91	1	951515	CAPACITOR .047µf 660 VAC	C23
92	1	38039	START UP BOARD ASS'Y	PCB5
93	1	952233	INDUCTOR OUTPUT	L1
94	1	36721	BUSBAR OUTPUT	
95	1	182W64	LOCK TWIST MIDGET	J1
96	1	36717	BRACKET OUTPUT	
97	1	32969	REACTOR ASS'Y HI FREQ.	T3
98	1	36431	SPARK GAP ASS'Y	SG
99	2	951342	CAPACITOR 2500pf 15 K V	C13, 14
100	1	951179	TRANSFORMER HI VOLTAGE	T5
101	1	950487	TERM. BLOCK 2 POS 20 A	TB1
102	2	672348	CAPACITOR .01µf 1KV (See wiring)	C11, 12
103	1	952204	CAPACITOR .01µf 250 VAC (See wiring)	C9
104	1	36718	BOX HI FREQ.	

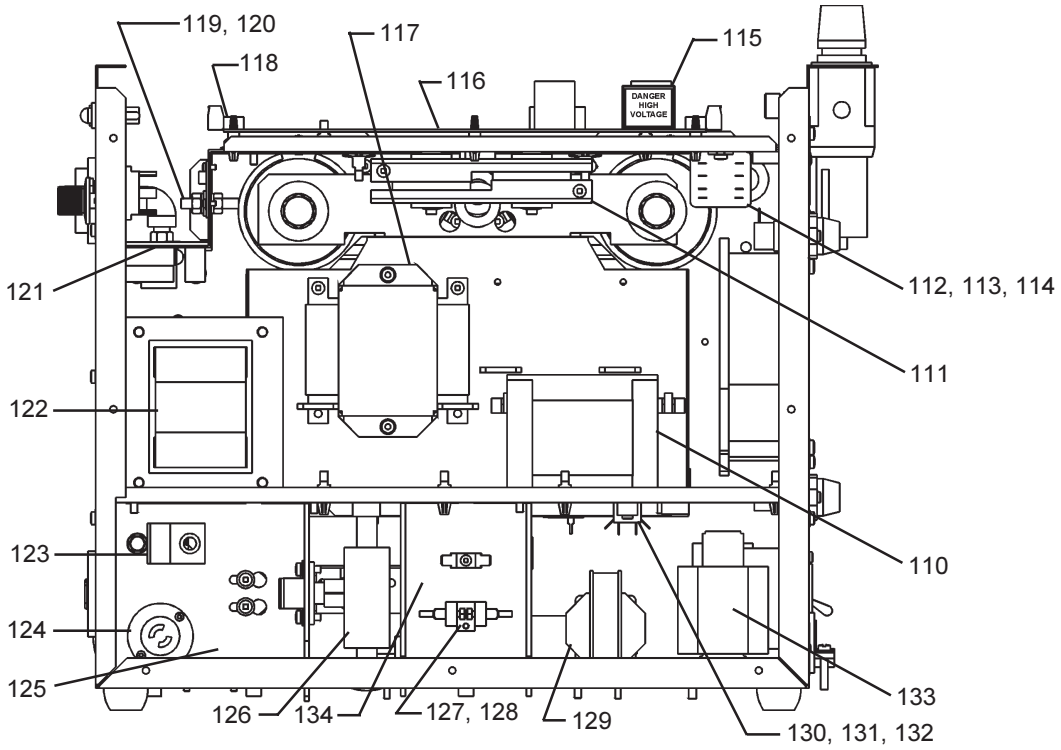


Fig. 6-5. PCM-875 Power Source, Right Side View (400/400CE/460/575 V)

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
110	1	32914	CONTROL TRANSFORMER ASS'Y	T2
111	1	951962	RESISTOR ASS'Y PILOT ARC	R11
112	1	952577	RELAY 25 A 120 VAC	K1
113	2	952557	CAPACITOR .82µf 630 VDC (See wiring)	C21, 22
114	2	17130310	RESISTOR 10 K OHM 1 W (See wiring)	R12, 13
115	1	23604891	LABEL WARNING HI VOLTAGE RED	
116	1	38109	CONTROL BOARD ASS'Y	PCB1
117	1	36586	MAIN TRANSFORMER ASS'Y (400/400CE/460 V)	T1
	1	36599	MAIN TRANSFORMER ASS'Y (575 V)	T1
118	2	951469	CAPACITOR .022µf 250 VAC (See wiring)	C17, 18
119	1	31488	SHUNT BOARD ASS'Y	PCB4
120	1	951515	CAPACITOR .047µf 660 VAC	C23
121	1	38039	START UP BOARD ASS'Y	PCB5
122	1	952233	INDUCTOR OUTPUT	L1
123	1	36721	BUSBAR OUTPUT	
124	1	182W64	LOCK TWIST MIDJET	J1
125	1	36717	BRACKET OUTPUT KYDEX	
126	1	32969	REACTOR ASS'Y HI FREQ.	T3
127	1	36431	SPARK GAP ASS'Y	SG
128	2	951342	CAPACITOR 2500pf 15 K V	C13, 14
129	1	951179	TRANSFORMER HI VOLTAGE	T5
130	1	950487	TERM. BLOCK 2 POS 20 A	TB1
131	2	672348	CAPACITOR .01µf 1KV (See wiring)	C11, 12
132	1	952204	CAPACITOR .01µf 250 VAC (See wiring)	C9
133	1	952213	REACTOR 3PH LINE 12 A	L2
134	1	36718	BOX HI FREQ	

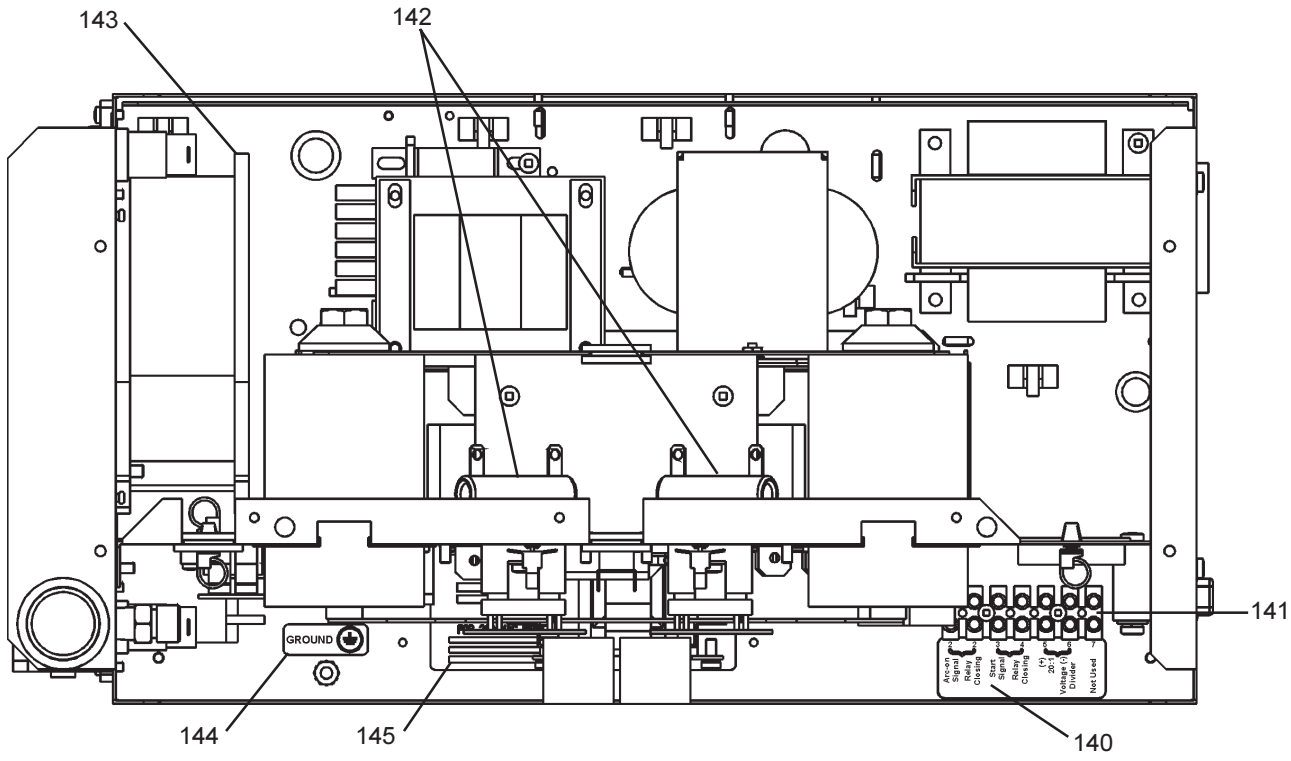


Fig. 6-6. PCM-875 Power Source, Top View with PCB1 and Shelf Removed

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
140	1	954673	LABEL CNC INTERFACE	
141	1	952026	TERM. BLOCK 7 POS 25 A	TB4
142	2	17240310	RESISTOR 10 K 25 W	R2, 15
143	1	951182	FAN AC AXIAL	M1
144	1	2091558	LABEL GROUND BLACK	
145	1	954700	LABEL INPUT (208/230 V)	
	1	954681	LABEL INPUT (400/460 V)	

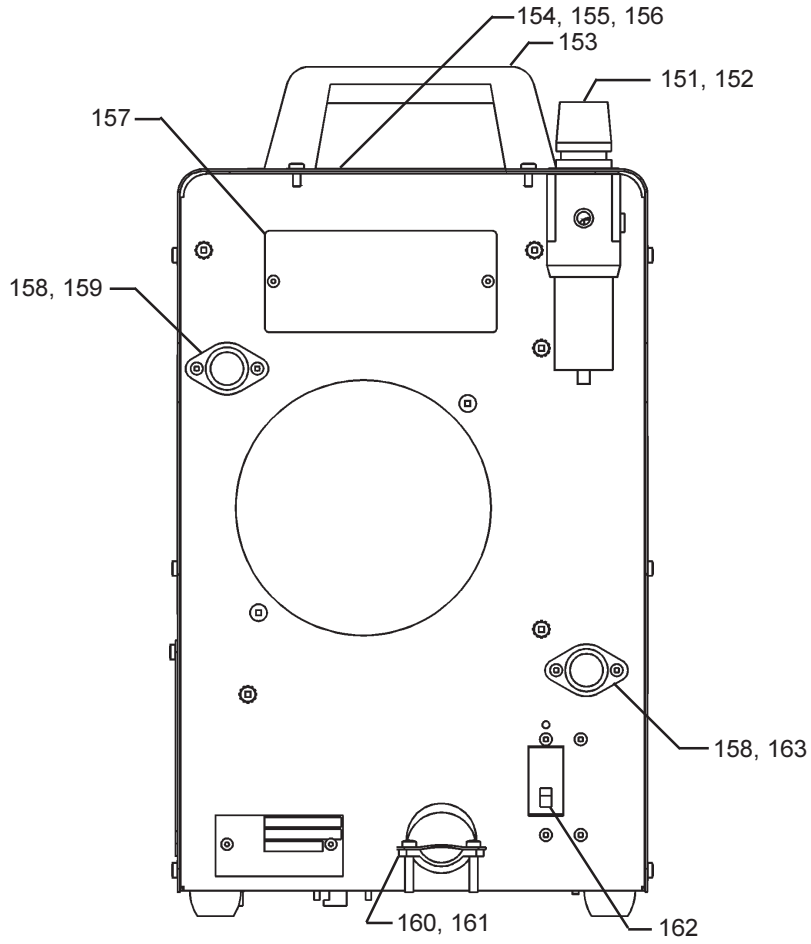


Fig. 6-7. PCM-875 Power Source, Rear View

Item No.	Qty. Req.	Part No.	Description	Circuit Symbol
151	1	21710	FILTER REGULATOR	
152	1	10Z30	ADAPTOR B/A-WM x 1/4 NPTM	
153	2	951575	HANDLE	
154	1	36719YL	TOP COVER YEL (ESAB)	
155	1	2091514	LABEL WARNING	
156	1	954290	LABEL WARNING	
157	1	954666	LABEL RATING PCM-875 208/230	
	1	954667	LABEL RATING PCM-875 400/460	
	1	954668	LABEL RATING PCM-875 575	
	1	954669	LABEL RATING PCM-875 400CE	
158	2	952136	FUSE HOLDER	
159	1	952137	FUSE 15 A FAST ACTING	F2
160	1	97W63	STRAIN RELIEF	
161	1	36823	INPUT POWER CABLE, 10 FT 4-COND. 6AWG (208/230 V)	
	1	35587	INPUT POWER CABLE, 10 FT 4-COND. 10AWG (400/460/575 V)	
	1	35582	INPUT POWER CABLE, 10 FT 4-COND. 4 x 4 MM (400 V CE)	
162	1	951801	CIRCUIT BREAKER 3P 70 A 250 VAC (208/230 V)	CB1
	1	951181	CIRCUIT BREAKER 3P 30 A 480 VAC (400/460 V)	CB1
	1	952046	SWITCH POWER TOGGLE 3PST (575 V)	S3
163	1	952559	FUSE 3A FAST ACTING	F1

INSTRUCTION MANUAL CHANGES

The "A" edition (2/98) of this manual covers the following changes:

1. Each replacement IGBT and bridge module now include the appropriate thermal pad.

The "B" edition (9/98) of this manual covers the following changes:

1. Added mechanized cutting installation using PT-20AM torch with the PCM-875.

2. Deleted discontinued L-TEC packages and parts.

The "C" edition (2/02) of this manual covers the following changes:

1. Revises Figure 3-3 to show the changes made to the electrode.

2. Revises Figure 4-1 to show the removal of the Valve Pin which is no longer a part of the PT-27 Torch.

3. The hi frequency gap is changed from "between .027 and .033" to "set to .040". (See page 23, Section E, Step 3).

The "D" edition (10/2006) of this manual covers the following changes:

1. Incorporated inputs from Charles Aimar on Pages 12, 14 and 31.

The "E" edition (07/2007) of this manual covers the following changes:

1. Added updated Disclaimer page after front cover.

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